Design and Development of Online Survey System

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ABSTRACT

Survey is a method of gathering information from a sample of individuals. It is one of the unavoidable events for most of the Company, enterprise, or organization with special purposes such as marketing research, public opinion polling, feedback, consumer satisfaction, and human resource. Besides, lecturers, academicians and researchers can also do the survey on their academic aspects or other researches. But most of them are facing abundant of problem with the traditional method.

Doing survey is one of the unavoidable events. But the key point is how far a survey can be conducted in a moderately effective and efficient way? Doing survey online is advisable and since an idea of Online Survey System (OSS) is being advocated.

OSS, or in other saying, a web based survey system, is being introduced in order to reduce or mitigate, even to complement the drawbacks of manual/ traditional methods. OSS is implementing able as long as the Internet access is available within the user's mean. Besides, the user is required to have at least one email account.

With the event of OSS, the users can create and design their own interactive online survey. OSS provides a fast and wide distribution of survey form to a large geographical area through email. The related respondents just need to click on the attached URL in the invitation email. Then they will be directed to the survey area. Afterward the OSS will generate analysis report based on the responses collected. Users will be able to get the results in tabular and pictorial forms.

ABSTRAK

Kajian tinjauan merupakan salah satu perkara yang tidak dapat dielakkan. Namun bagaimana untuk menjalankan kajian tinjauan tersebut secara berkesan merupakan sebuah kunci utama yang patut dititikberatkan. Menjalankan kajian tinjauan secara *online* adalah dianggap wajar dan berikutan idea *Online Survey System (OSS)* diperkenalkan.

OSS, atau dengan kata lain, sebuah sistem kajian tinjauan yang berdasarkan konsep web, diperkenalkan demi mengurangkan atau meminimakan, lebih-lebihan sebagai pelengkap bagi cara-cara kajian tinjauan yang sebelum diamalkan secara *manual* atau tradisional. *OSS* dapat diimplementasikan selagi perkhidmatan *Internet* adalah didapati. Selain itu, pengguna adalah diwajidkan mempunyai sekurang-kurangnya satu akaun email.

Dengan perkenalan *OSS*, pengguna-pengguna dapat mencipta dan mereka soal selidik secara interaktif. *OOS* memungkinkan kajian soal selidik yang dihasilkan diagihkan dalam kadar yang cepat dan berlanjutkan ke sebuah kawasan lingkungan geografi yang agak luas dengan melalui email. Pihak berkaitan hanya perlu clik pada *URL* yang diiringi bersama *invitation* email. Selepasnya mereka akan ditujukan ke tempat dimana soal selidik telah disediakan. *OSS* akan menghasilkan laporan analisis berdasarkan hasil kajian yang dikumpulkan. Pengguna-pengguna selanjutkan akan memperolehi keputusan yang berkenaan dalam format berbentuk *tabular* dan graf.

ACKNOWLEDGEMENT

During the preparation of this thesis project's proposal, many people have been lending helping hands, giving encouragements and invaluable advices to me, which enable this proposal to be completed on time.

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Special thanks also go to my fellow course mates, friends and senior for sharing their time and knowledge with me. Their supports and motivations are deeply appreciated. I feel grateful to have their encouragements whenever I encounter difficulty.

Last but not least, I like to thank my family and friends for their support throughout my years of studies in University of Malaya. Their encouragement and words of wisdom have truly motivated me and strengthen my spirits in performing my best in every field I am involved in. Once again, thank you very much!

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CHAPTER 1: INTRODUCTION

1.1 Project Overview

What is survey? Survey is a method of gathering information from a sample of individuals. This sample is usually just a fraction of the population being studied. Survey can be conduct in many ways such as paper out paperback, by telephone, by mail, interview or in person and etc. But there are many problems faced in these traditional methods.

An Online Survey System (OSS) is a Web Based Application that automates the whole process of conducting a survey. It includes designing survey, distributing survey to respondents and analyzing survey result. OSS spawns a new method for conducting surveys through email and the World Wide Web. Web surveys are "hosted" on a website.

System sends invitation via email to invite target respondent to answer the survey. The respondent will visits the survey website by clicking the hyperlink attached in the email. Compared with the traditional method of surveying, Online Survey System is (1) Less time spend (2) Easier to implement (3) Reduce the manpower spend (4) Cheaper to conduct.

1.2 Problem Definition

The manual / traditional practice of surveying consist many weaknesses. Some major weaknesses stated below:

I) Time Spend

i) Lots of paper work

Paper-based surveys take times (printing, distributing, collecting back) and even the worst task which is analysis level (check manually) where we have to check one by one and draw graph for every survey question. Studies show that the increase of paper work will increase the human error as well.

ii) Manual data analysis

Many works need to do when analysis the data such as categorize, code, sort out manually before analysis to draw conclusion and assumption from the surveys.

II) Restrict to certain geographical area

Traditional survey hardly can conduct across countries and around the world because of the constraint of time, cost and manpower spend.

III) High cost

In the traditional survey, we need to calculate the cost of paper, print and Photostat. Besides we need to hire people to distribute and collect, checking, producing survey form and analyze the data collected.

IV) Result

Human errors and peccadilloes do exist in the traditional survey methods such as mismatch the survey objective that lead to unqualified even erroneous questionnaires, self limitations (individual or team's experience) and so on. This leads to the inaccurate of the result.

1.3 Project Objectives

The main objective to design and development of Online Survey System is to solve the above traditional survey problems. The core objectives are:

I) Allow user to plan, customize, construct, modify, or reproduce the surveys in a quick, automated, dynamic and easy way. Provide instant survey analysis processes in the pictorial forms, such as graphs, charts and table views of data as well as the savable and printable facilities. Indirectly will save lots of time.

II) Allow fast distribution of the survey form to a large geographical area through emails.

III) Enable the interactive online survey processes which involve give (distribute) and gain (feedback). This will directly minimize or mitigate the cost of conducting a survey.

IV) Provide attractive user-friendly graphic interface of survey. Indirectly will help to increase the response rate and the accuracy of the result.

1.4 Project Scope

The Online Survey System is specially designed to ease the survey conducting procedures as well as to solve the traditional survey methods' drawbacks. The available scopes are:

I) The survey information is available in English version only.

II) OSS is web application where users should have internet access together with personal or specific purpose email accounts.

III) The system should allow users to conduct the survey according to their requirements.

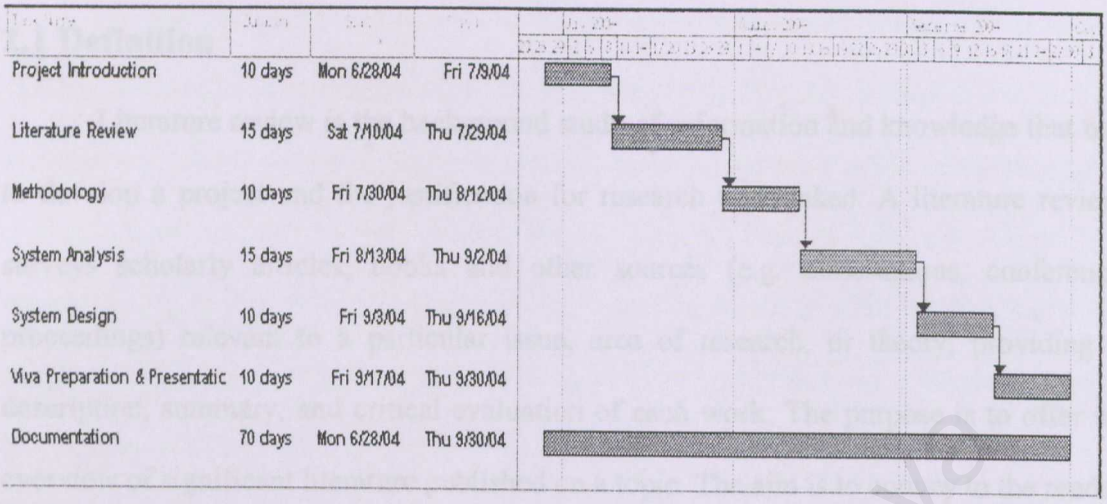
IV) The system should be able to perform simple analysis processes.

V) The system should have its own database system to keep track of the records.

VI) Targeted Audience

a. All users in different domains who are interested in online survey project title.

1.5 Project Schedule (WXES 3181)



Task Name	Duration	Start	Finish
Project Introduction	10 days	Mon 6/28/04	Fri 7/9/04
Literature Review	15 days	Sat 7/10/04	Thu 7/29/04
Methodology	10 days	Fri 7/30/04	Thu 8/12/04
System Analysis	15 days	Fri 8/13/04	Thu 9/2/04
System Design	10 days	Fri 9/3/04	Thu 9/16/04
Viva Preparation & Presentatic	10 days	Fri 9/17/04	Thu 9/30/04
Documentation	70 days	Mon 6/28/04	Thu 9/30/04

Figure 1.1: Project Progress

CHAPTER 2 LITERATURE REVIEW

2.1 Definition

Literature review is the background study of information and knowledge that use to develop a project and the justification for research undertaken. A literature review surveys scholarly articles, books and other sources (e.g. dissertations, conference proceedings) relevant to a particular issue, area of research, or theory, providing a description, summary, and critical evaluation of each work. The purpose is to offer an overview of significant literature published on a topic. The aim is to convey to the reader what knowledge and ideas have been established on a topic, and what their strengths and weaknesses are.(*http://info.wlu.edu/literature_review/literature_review.html*, 25/9/2004).

There are three sections will be discussed in this chapter:

(1) Questionnaire;

(2) Existing system reviews;

(3) Supportive findings (summary).

2.1.1 Questionnaire

Survey questionnaire owns the characteristics:

i) The people need to be questioned are widely dispersed;

ii) A quick way to gather massive amount of data;

iii) An exploratory study and overall opinion to be gauged before the project can be design properly.

2.1.1.1 Design and Development of Questionnaire

The questionnaire was designed with the aim to survey the usage of computer, Internet and online survey. It consisted of two main parts. Namely section A and section B. Section A mainly depicted the demographic details of the respondent whereas section B emphasized on the survey related issues. The respondent was ensured of the confidentiality of the information given. The questionnaire had been tested in order to ensure the readability before the survey being conducted. Several amendments also been done along with the testing process.

2.1.1.2 Conducting Survey

Completed and tested questionnaire was then been printed out and photocopied into an amount of 150 copies. Afterward they were distributed among undergraduates, staffs, and lecturers from different faculties of UM as well as the people outside. In order to ensure the balance between the distribution and the feedback, the questionnaire were collected on the spot during the proceeding.

2.1.1.3 Analysis

The questionnaires had been processed and analyzed by using the SPSS version 12.0 software. The result's outcomes then being quantified and tabulated. The pictorial forms were utilized as well in order to promote understanding and readability among the readers.

2.1.1.3.1 Demographic Details

Table 2.1: Gender Proportion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	73	48.7	48.7	48.7
	Female	77	51.3	51.3	100.0
	Total	150	100.0	100.0	

Table 2.1 had shown a rather balanced proportion between males and females who had participated in the survey questionnaires.

Table 2.2: Age Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 25	134	89.3	89.3	89.3
	26-30 years	9	6.0	6.0	95.3
	31-40 years	7	4.7	4.7	100.0
	Total	150	100.0	100.0	

Table 2.2 had shown that the respondents were mostly comprised of those with the age below 25. The wide range of the specified age group had contributed to the formation of such outcome.

Table 2.3: Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Academician	142	94.7	94.7	94.7
	Researcher	5	3.3	3.3	98.0
	Others	3	2.0	2.0	100.0
	Total	150	100.0	100.0	

Table 2.3 had shown the occupation of the participants who are mostly the academicians. The formation of such outcomes was due to the survey conducting processes that were mostly conducted within University of Malaya.

2.1.1.3.2 Survey

Table 2.4: Importance of Survey Questionnaire Generating Processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	61	40.7	40.7	40.7
	Important	77	51.3	51.3	92.0
	Not very important	10	6.7	6.7	98.7
	Not at all	2	1.3	1.3	100.0
	Total	150	100.0	100.0	

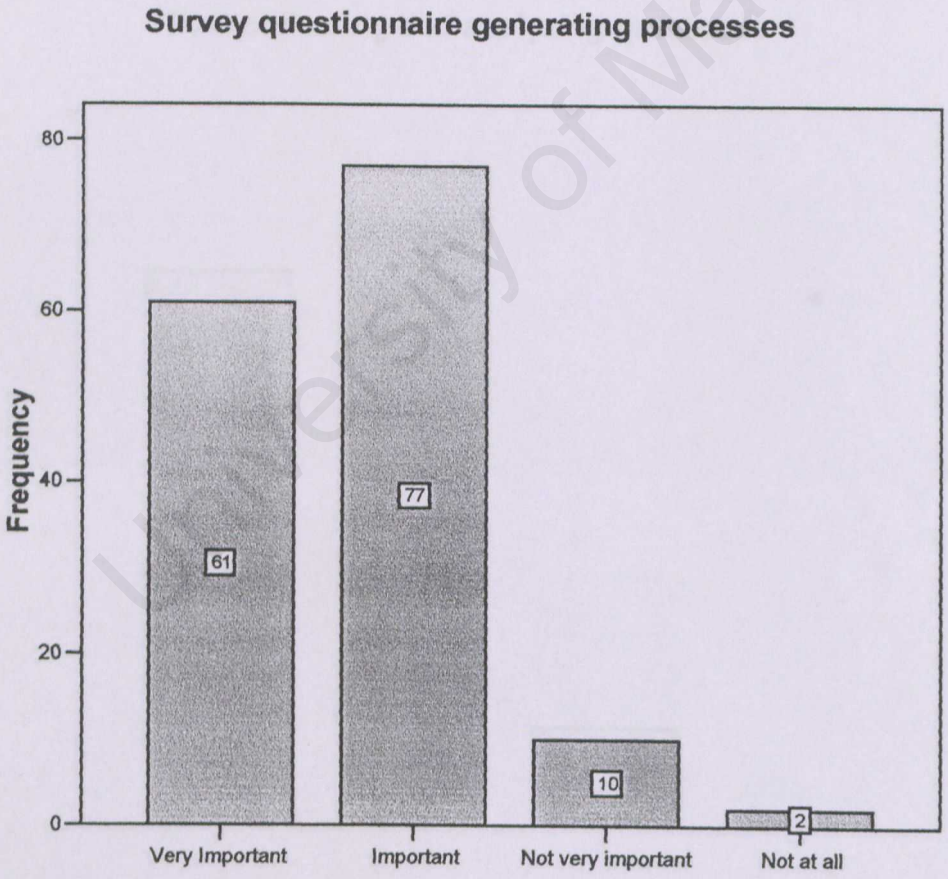


Figure 2.1: Importance of Survey Questionnaire Generating Processes

Table 2.5: Importance of Data Collecting and Analyzing Processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	65	43.3	43.3	43.3
	Important	72	48.0	48.0	91.3
	Not very important	12	8.0	8.0	99.3
	Not at all	1	.7	.7	100.0
	Total	150	100.0	100.0	

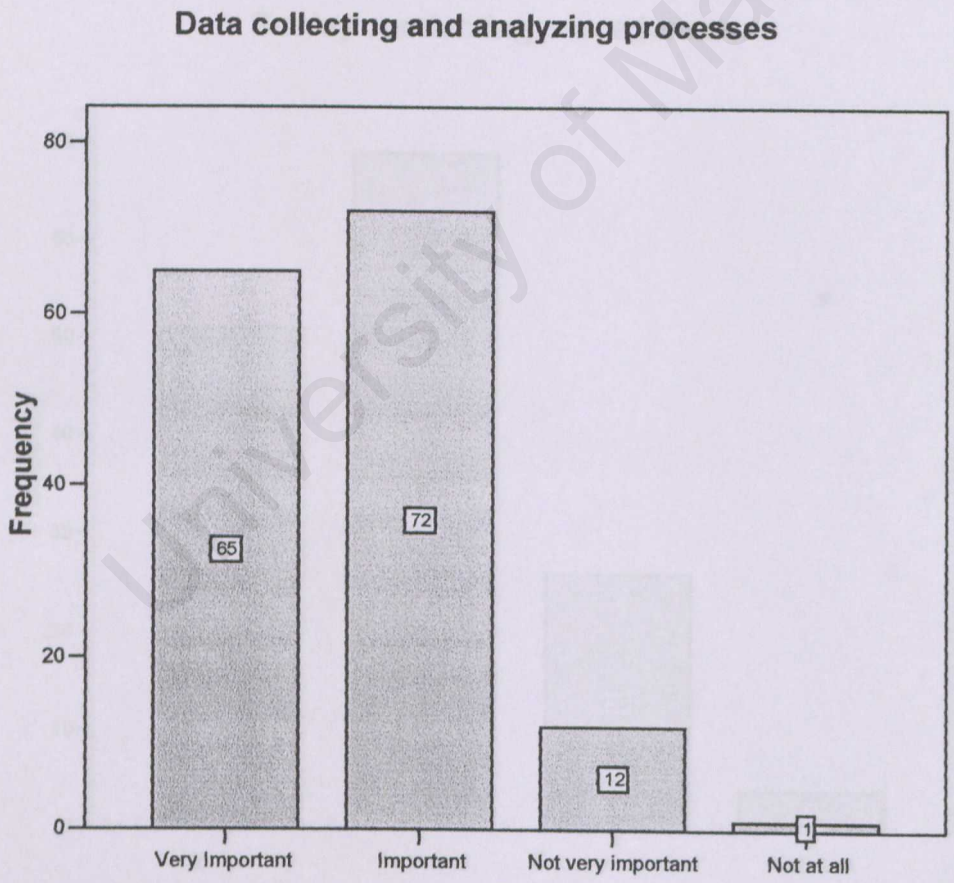


Figure 2.2: Importance of Data Collecting and Analyzing Processes

Table 2.6: Importance of Survey Conducting Procedures

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	51	34.0	34.0	34.0
	Important	69	46.0	46.0	80.0
	Not very important	26	17.3	17.3	97.3
	Not at all	4	2.7	2.7	100.0
	Total	150	100.0	100.0	

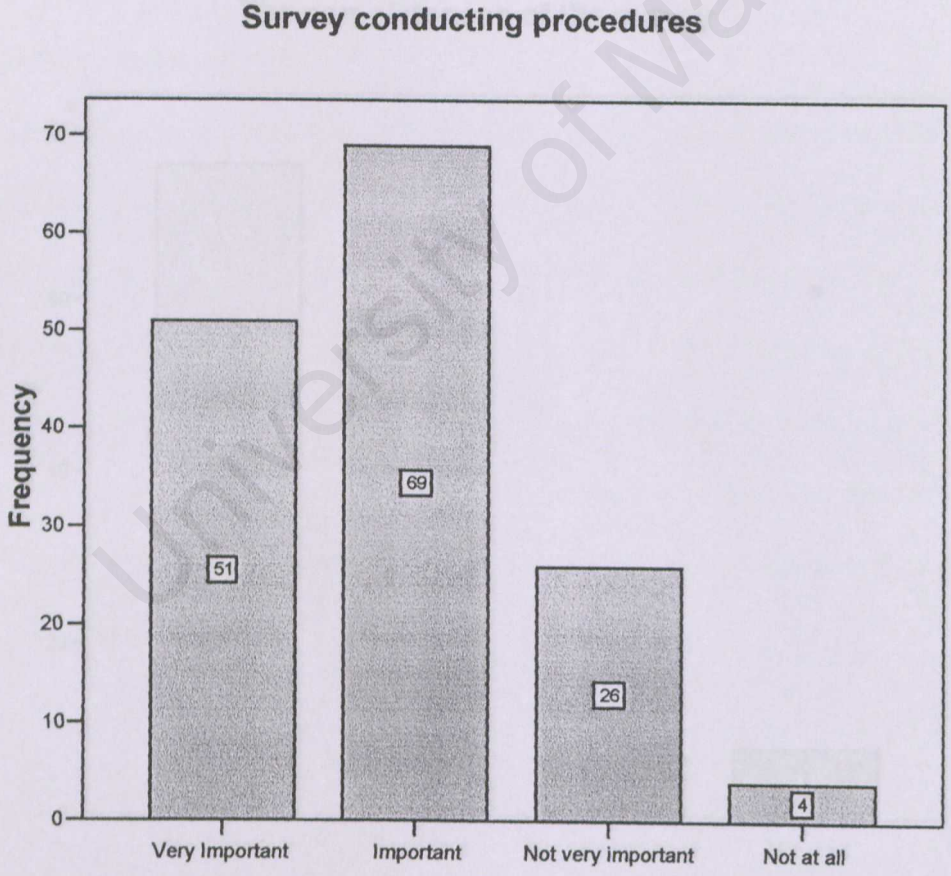


Figure 2.3: Importance of Survey Conducting Procedures

Table 2.7: Importance of The Completeness Of The Survey

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Important	76	50.7	50.7	50.7
	Important	59	39.3	39.3	90.0
	Not very important	7	4.7	4.7	94.7
	Not at all	8	5.3	5.3	100.0
	Total	150	100.0	100.0	

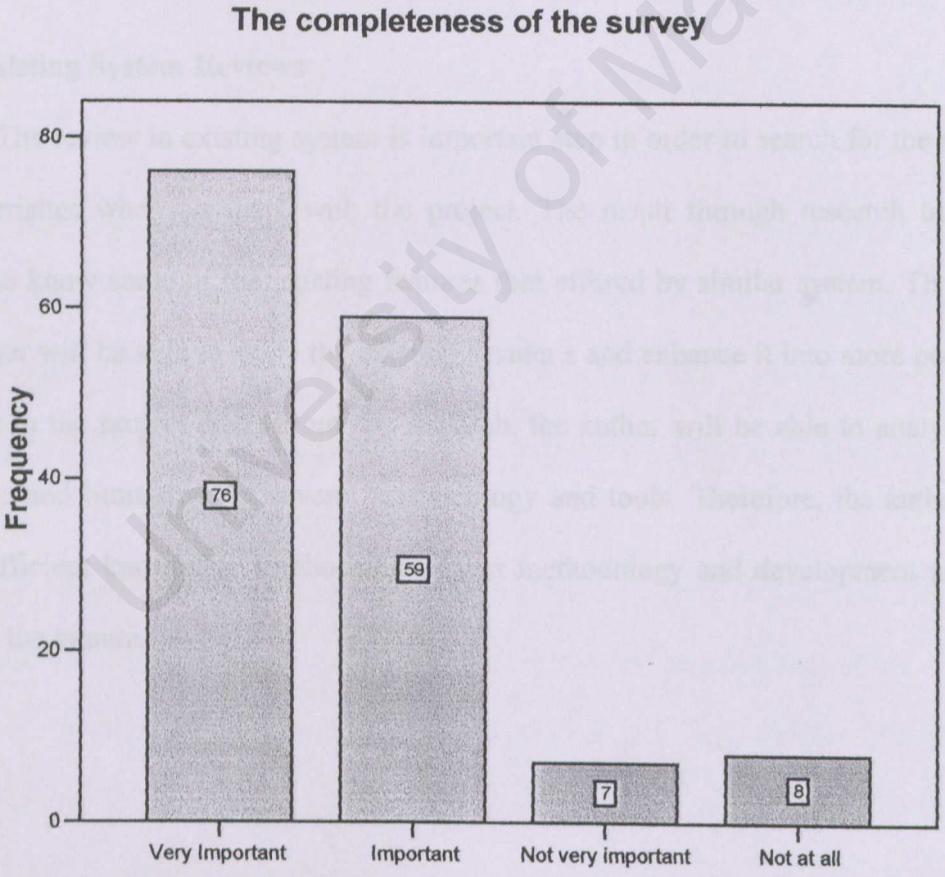


Figure 2.4: Importance of The Completeness Of The Survey

From the tables and their associated graphs shown above, namely from Table 2.4 to Table 2.6 and from Figure 2.1 to Figure 2.3, most of the participants consents that survey questionnaire generating processes, data collecting and analyzing processes and survey conducting procedures are important since these ensuring the quality, integrity and precision of the surveys conducted. Table 2.7 and its associated Figure 2.4 shown a noticeable outcome due to participants considered the difficulties might they be encountered in producing accurate and trustworthy analysis results. For instance the incompleteness of certain questions in a questionnaire might result an accurate analysis outcome in a tabular form but in contrary in its pictorial form.

2.1.2 Existing System Reviews

The review in existing system is important step in order to search for the similar characteristics when compare with the project. The result through research help the author to know some of the existing features that offered by similar system. Therefore the author will be able to study the existing system s and enhance it into more powerful features in the project later. From the research, the author will be able to analysis the strengths and limitations of several methodology and tools. Therefore, the author will have sufficient knowledge in choosing correct methodology and development tools to develop the system.

2.1.2.1 Case Study 1: CreateSurvey

URL: http://www.createsurvey.com/

Date Accessed: August 07, 2004.

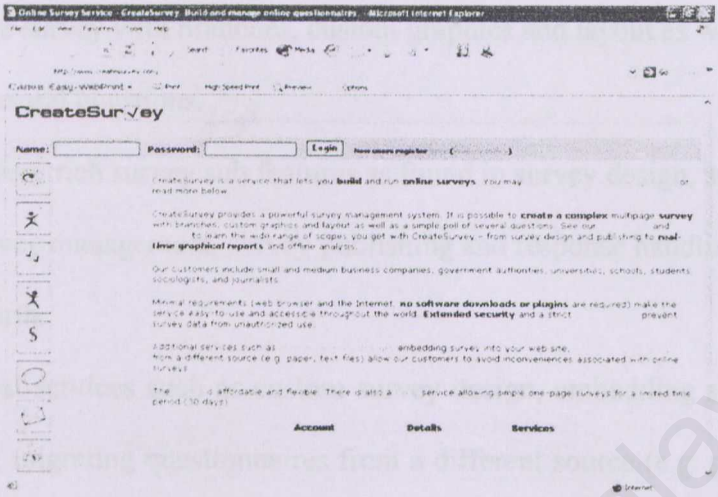


Figure 2.5: CreateSurvey Main Page View

CreateSurvey (1999) user interface is very simple, static and not so compelling or boring some (text based dominant) in general view. All the required information or services can be obtained by clicking the links or the small graphics aside and no command is needed. Demonstrations and Frequently Asked Question (F.A.Q) are provided to ease its usage understanding.

CreateSurvey Minimal requirements (web browser and the Internet, no software downloads or plug-ins are required) make the service easy-to-use and accessible throughout the world. However this service requires member login and payment at an affordable and flexible rate. Free service allowing simple one-page surveys for a limited time period (30 days) is also available.

Strength:

i) Simple design and mostly text-oriented make it fast to load.

ii) Powerful survey management system with the possibility to create a complex multipage survey with branches, custom graphics and layout as well as a simple poll of several questions.

iii) Owns a very rich survey sub features as found in survey design, survey content type, survey management, survey publishing and response handling, reporting and so forth.

iv) Additional services such as custom survey design, embedding survey into your web site; migrating questionnaires from a different source (e.g. paper, text files) allow their customers to avoid inconveniences associated with online surveys.

v) Extended security and a strict privacy policy prevent survey data from unauthorized use.

Weaknesses:

i) Poor site flow design – it takes too many step and long flow of pages to accomplish a single task.

2.1.2.2 Case Study 2: SurveyShare.com

URL: http://www.surveyshare.com/

Date Accessed: August 10, 2004.

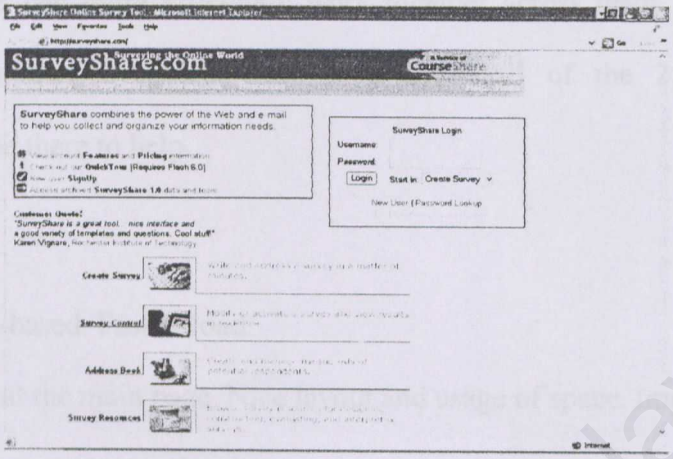


Figure 2.6: SurveyShare.com Main Page View

SurveyShare is a Web site for designing and conducting online surveys. Users can write a survey, send e-mail invitations to potential respondents, and view responses in real-time. Subscription members can also share their surveys and survey results with each other.

Years of development by a research team at Indiana University have resulted in a tool that is extremely user-friendly and well designed. Creating a survey with SurveyShare is a very simple process. Users can create and distribute a survey in less than 2 minutes! Additionally, SurveyShare.com has provided more than 100 carefully crafted survey templates that make the survey generation process even easier. Once a survey is complete, SurveyShare has the tracking, reporting, and data analysis features that user would typically expect only from products that are much more complicated and expensive. For instance, user can send friendly e-mail reminders to your potential

respondents that help maximize the number of responses to your survey. SurveyShare also has collaboration options that surpass other Web-based survey tools. Using these special "Share" features, members can share surveys and results with other members. In this way, members can more efficiently work together across team, department, and organizational boundaries. Collaboration is a key skill of the 21st century and SurveyShare will be there to help.

Strength:

i. Highly text-based. Fast to load.

ii. Clear view at the main page. Nice layout and usage of space. Important notice can be seen as you enter the site.

iii. More interesting design.

2.1.2.3 Case Study 3: Zoomerang

URL: http://www.zoomerang.com/

Date Accessed: August 20, 2004.

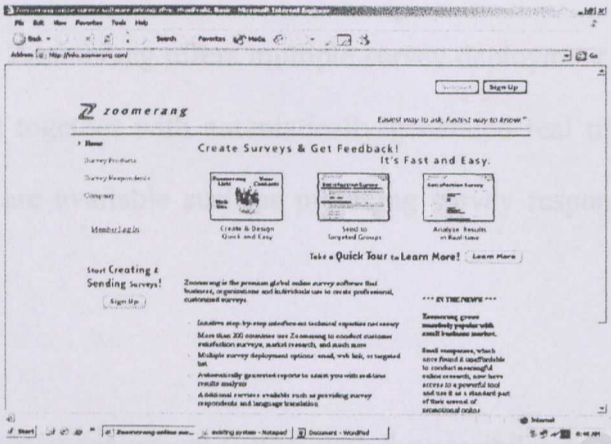


Figure 2.7: Zoomerang Main Page View

Zoomerang, the world's premier online survey software, was launched by MarketTools, Inc. in 1999 to provide a powerful, streamlined alternative for organizations needing to conduct accurate, comprehensive surveys with a minimum of cost and effort. The Zoomerang concept - an easy to use, Internet-based survey tool allowing customers to design and send surveys and analyze the results in real time - became an almost instant hit, fueled by word of mouth from satisfied customers.

The Zoomerang user interface is quite compelling, comfortable, less complicated and vivid and balance in design architecture (graphical and textual). No command is required and the transactions are done through links and attractive buttons. Login is required in order to access the services. The quick and interesting tours lead to the ease of use of this survey software.

Interactive communication is available on the main site via 'Contact Us' link. Zoomerang also provides a brief depiction on how it functions. This improves the understanding among its site users.

Furthermore, Zoomerang offers multiple survey deployment options: email, web link, or targeted list together with automatically generated real time analysis reports. Additional services are available such as providing survey respondents and language translation.

Strength:

i) Powerful survey management system with the possibility to create a complex multipage survey with branches, custom graphics and layout as well as a simple poll of several questions.

ii) Owns a very rich survey sub features as found in survey design, survey content type, survey management, survey publishing and response handling, reporting and so forth.

iii) Additional services such as custom survey design, embedding survey into your web site; migrating questionnaires from a different source (e.g. paper, text files) allow their customers to avoid inconveniences associated with online surveys.

iv) Extended security and a strict privacy policy prevent survey data from unauthorized use.

Weaknesses:

i) Poor site flow design – it takes too many step and long flow of pages to accomplish a single task.

2.1.2.4 Case Study 4: SuperSurvey

URL: http://www.supersurvey.com/

Date Accessed: September 6, 2004.

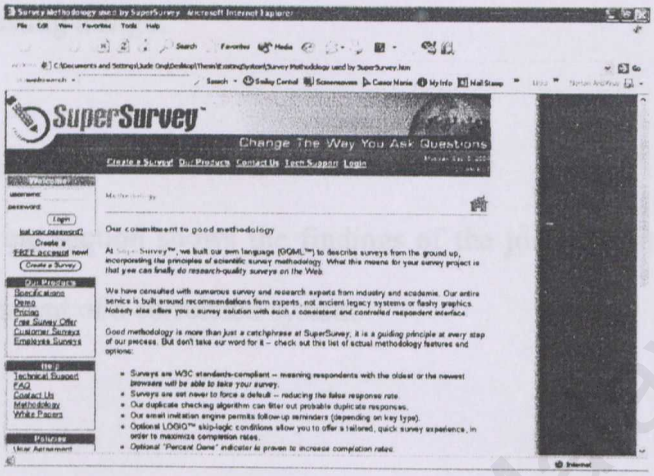


Figure 2.8: SuperSurvey Main Page View

The SuperSurvey™ online survey system is the flagship product of Tercent, Inc. Based in Portland, Oregon, Tercent has been a leader in producing professional online survey tools since 2001.

Professionals, through the use of superior technology, dedicate superSurvey team to enabling the creation of trustworthy, secure, and useful novel knowledge. According to their philosophy, the first great change enabled by the Internet was providing people access to knowledge.

The mission of SuperSurvey is to combine technical expertise, creative thinking, and their vision of providing access to the production of knowledge in order to solve problems for businesses and organizations. The goal of the SuperSurvey product team is to ease the technical "pain" of large-scale survey projects for professional decision-makers.

Strength:

i) Clear view at the main page. Nice layout and usage of space. Important notice can be seen as you enter the site.

ii) More interesting design.

2.1.3 Relevant Findings

The following section shows the findings of the journal that is relevant to the design and development of a correlated system.

2.1.3.1 Summary

Sharon Parker, M.A., Michael J. Schroeder and James W. Fairfield-Sonn in a journal titled "Advantages of Online Surveys" (*http://www.surveysupport.com/kcenter/planning /WhySurveyOnline.pdf*, 10/7/2004) have shown the seven advantages in using the Internet as medium for survey research.

Seven Advantages

i) Convenience

ii) Accessibility

iii) Low cost

iv) Quicker response time

v) Reduction of missing responses

vi) Efficient collection of comments

vii) Safe to use.

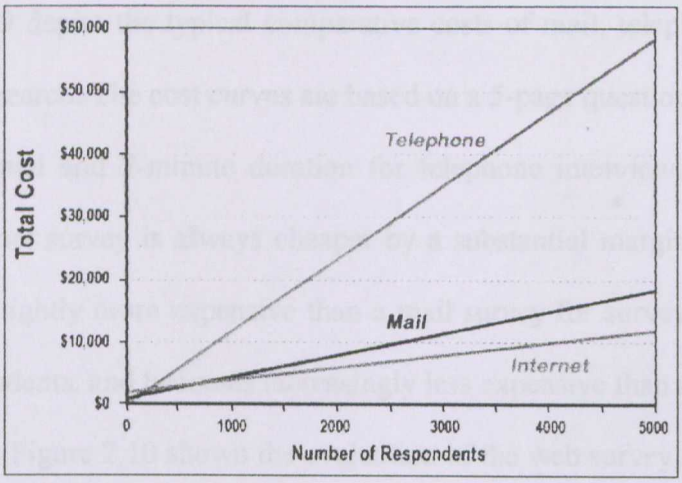


Figure 2.9: Mail, Telephone, and Internet (Web) Survey Research Cost Comparisons (*http://www.swiftinteractive.com/white1.asp*, 10/7/2004).

	E-Mail	Converted CATI	Converted Disk-By-Mail	Web CGI Programs	Web Survey Systems
Ease of creation / modification	Excellent		Good	Poor	Excellent
Ease of Access to Preliminary Data	Poor		Good	Excellent (w/ extra programming)	Excellent
Sample Quota Control	Poor	Excellent		Excellent (w/ extra programming)	Excellent
Data Validity Checks	Poor	Good	Good	Excellent (w/ extra programming)	Excellent
Demand of Respondent's Attention	Excellent	Good	Good	Good	Good
Personalization of Questionnaires	Fair		Poor	Excellent (w/ extra programming)	Excellent
Conversion of Existing Questionnaires	Fair	Excellent	Good	Good	Good
Expertise Required by Questionnaire Creator	Low	High	Moderate	Very High	Moderate
Cost per completion	Inexpensive	Expensive	Expensive	Very Expensive	Moderate to Inexpensive

Figure 2.10: The Strengths and Weaknesses ((*http://www.swiftinteractive.com/white1.asp*, 10/7/2004)

In considering of "should we use the Internet for quantitative survey research?" James Watt in a journal titled "Using the Internet for Quantitative Survey Research" (*http://www.swiftinteractive.com/white1.asp*, 10/7/2004) has pointed out several supportive reasons.

Figure 2.9 depict the typical comparative costs of mail, telephone, and Internet (Web) survey research. The cost curves are based on a 5-page questionnaire; with a 35% return rate for mail and 7-minute duration for telephone interviewing. As the figure shows, the Internet survey is always cheaper by a substantial margin than a telephone survey, is only slightly more expensive than a mail survey for surveys with fewer than about 500 respondents, and becomes increasingly less expensive than mail for more than 500 respondents. Figure 2.10 shown the evaluation of the web survey systems compared with the other methods or technologies. The summary table depicts that the web survey systems has shown commendable and noticeable strengths in almost all the aspects.

Janet Ilievam, Steve Baron and Nigel M Healey in an international journal of Market Research titled "Online surveys in marketing research: Pros and cons" (*http://www.bmra.org.uk/documents/181.doc*, 10/7/2004) have pointed out the pros of online surveys as well as the accompanied cons.

The major advantages of online survey are:

i) very low financial resource implications

ii) short response time

iii) researcher's control of the sample (and no involvement in the survey)

iv) Data are directly loaded in the data analysis software, thus saving time and resources associated with the data entry process.

Some limitations of online surveys:

i) For large-scale cross-country surveys the multimode approach (i.e. online and postal) compensates for the misrepresentation of the general population

ii) Online surveys stems from the technology required, which still suffers from being insufficiently useroriented

iii) Across all groups of users, the most commonly experienced problem with web surveys stems from the time necessary to download pages, encountered by 64.8% of respondents (Kehoe et al. 1998).

CHAPTER 3 METHODOLOGY

3.1 Project Development Life Cycle

The system development methodology is a systematic description of the sequence of activities required to develop an information system. In order to develop a system in a organized an effective way, it is necessary to follow a sequence of steps to accommodate a computer set of tasks, which is generally called a process. Each system development process (see figure 3.1) includes system requirements (user needs and resources) as input and a finished product as output.

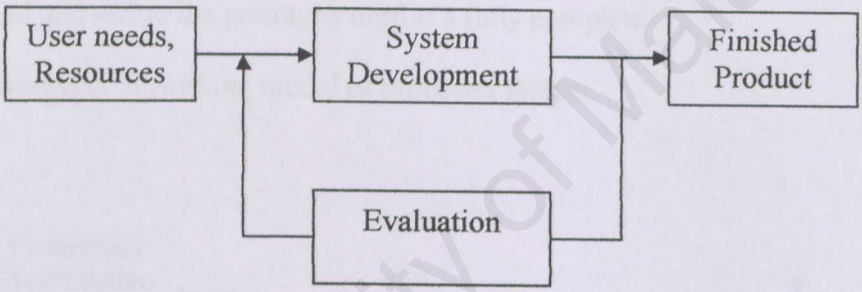


Figure 3.1: System Development Process Model

There are several process models in system development:

1. Waterfall Model with prototyping
2. V Model
3. System Development Life Cycle (SDLC)
4. Spiral Model
5. Evolutionary Prototyping Model
6. Waterfall Model

Three process models are being chosen for consideration before determining the most appropriate. These models are Evolutionary Prototyping Model, Waterfall Model with Prototyping and Spiral Model.

3.1.1 Evolutionary Prototyping Model

Evolutionary Prototyping Model (see figure 3.3) is a lifecycle model in which the system is developed in increments so it can be modified in response to the end user and customer feedback (*www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004).

i. Develop system concept when moving through the project
ii. Usually begin with developing the most visible aspects of the system
iii. Add and refine the prototype until it's fully complete
iv. Prototype: a working model of proposed system.

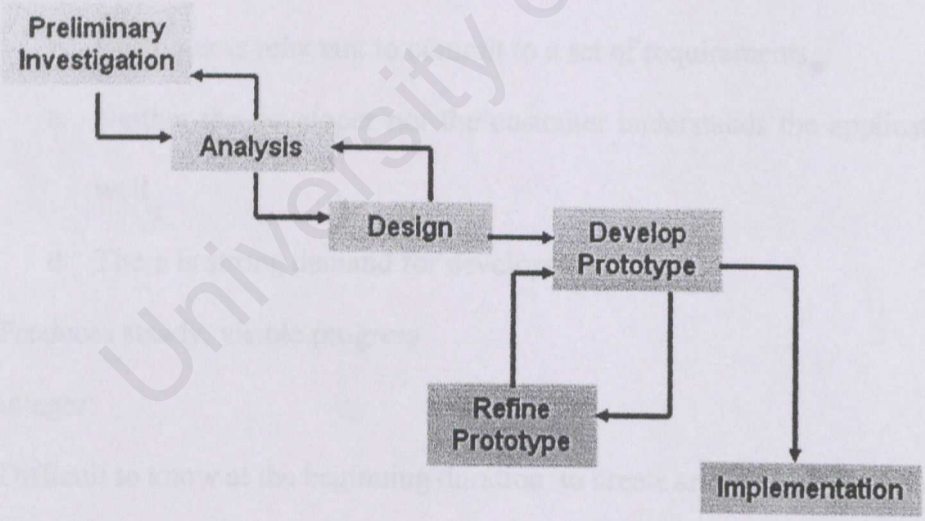


Figure 3.2: Evolutionary Prototyping Model

(*http://brahma.bpa.arizona.edu/MIS111Fall2002/docs/1*, 2/7/2004)

When to use (*www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004):

i. System is poorly understood - don't fully understand the architecture

ii. Expect a lot of surprises - will focus on the *high risk segments first*

iii. Experienced developers

Key to success (*www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004):

i. Experienced developers

ii. Managing schedule and budget expectations

iii. Managing the prototyping activity itself

Advantages (*http://brahma.bpa.arizona.edu/MIS111Fall2002/docs/1*, 2/7/2004):

i. Especially useful when

   a. Requirements are changing rapidly

   b. Customer is reluctant to commit to a set of requirements

   c. Neither the developer nor the customer understands the application area well

   d. There is strong demand for development speed

ii. Produces steady, visible progress

Disadvantages:

i. Difficult to know at the beginning duration to create an acceptable product. (*http://brahma.bpa.arizona.edu/MIS111Fall2002/docs/1*, 2/7/2004)

ii. Poor design and maintainability.

iii. Inefficiency use of prototyping time. (*www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004)

iv. Unrealistic budget expectations.

(*www.business.mnsu.edu/brownw1/458BP/RAD.pdf*, 2/7/2004)

v. Can easily become an excuse to do code-and-fix development

(*http://brahma.bpa.arizona.edu/MIS111Fall2002/docs/1*, 2/7/2004)

3.1.2 Waterfall with Prototyping

Waterfall model can be amended with prototyping to improve understanding. This model is simple to use. It is suited to develop large and complex system. This development is to proceed linearly through the phases of requirement analysis, system design, program design, coding, unit and integration testing, system testing, acceptance testing, operation and maintenance.

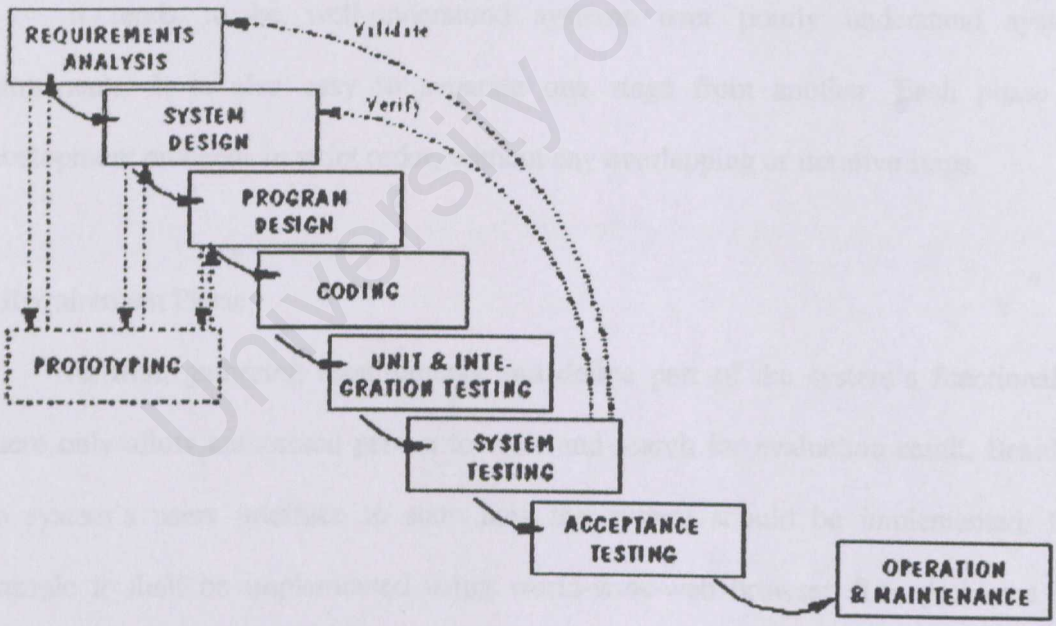


Figure 3.3: Waterfall with prototyping model

(*http://perdana.fsktm.um.edu.my/~wxes3204/SE_2_0304/sw_models_1.ppt*, 30/6/2004)

Advantage of waterfall model:

i) Enforced discipline through documents

ii) Cannot perform a phase without the previous phase and it will then checked by SQA group.

iii) It shows the concrete evidence of progress.

iv) Testing carried out during all phases of life cycle.

v) A schedule can be control to with deadline for each stage to ensure it delivered within time period and product can be proceed through development phase.

vi) It can also control budget to ensure it didn't over budget and documentation.

vii) It has measurement value where the management knows where project is at and what is to be done.

viii) It produced software where its components can be used in other project.

It tends to be well-understood systems over poorly understand system components. It is also easy to separate one stage from another. Each phase of development proceeds in strict order, without any overlapping or iterative steps.

1. Requirement Phase

At first, gathering requirements and define part of the system's functionality where only allow authorized person to view and search for evaluation result. Besides, the system's users interface to state how the system should be implemented. For example it shall be implemented using world-wide-web browser. The problems are specify along to achieve the goals and constraints are identified. Survey on the process has been done through internet. Besides, list out the requirements by discussion with supervisor. Software and hardware requirement also has been find out as well as

determined and research on existing system. The analysis has been done to analyze and refine the requirements to achieve the detailed understanding of the requirements for developing a software product correctly and maintaining it easily. After getting the requirement, requirements are analysis and negotiation where requirement are analyzed and conflicts resolved through negotiation. Negotiation is important because different people will have different opinion. In this phase, it must be clearly communicates system with end user where it is complete, unambiguous and understandable. Context diagram and also data flow diagram has been drawn to show the functionality provide by the system. The hardware and software requirement also determined at this stage.

2. System Design Phase

In this phase, flow chart and structure chart is designed to show the overall view in which how the data is passes and the system is communicate with each other.

3. Program Design Phase

In system design phase, the system specification is translated into software representation. It is derived in which satisfy software requirement. This design phase can be divided into three level which are architecture level, high level and low level.

Design phase consist of architecture design, interface design and database design. By the end of this phase, software engineer should be identified relation between hardware, software and the associated interface.

4. Coding Phase

Start writing the code for the system based on the system design.

5. Units and Integration Testing Phase

Testing is important in where to verify each unit meets its specification and find out any errors in the system. If it is failed, then system prototype has to be redefined or program stage reprocessed. Once successfully, all program units are tested in separate module. It will then integrate and tested together to ensure that the complete system meets the software requirements and to make sure they work properly when joined with others. System is being testing to ensure the functions and interactions specified initially have been implemented properly.

6. System Testing Phase

In this phase, validation and verification testing is important where validation is needed to ensure that the system has implemented all of the requirements so that the system function can be traced back to a particular requirements in the specification while verification is to ensure that each function work correctly as needed.

7. Acceptance Testing

Besides test by developers, it is also important to test by customer of the E-Appraisal system to make sure it meets their understanding of requirement, which may be different of understanding of developers.

8. Operations and Maintenance Phase

In this phase, software is installed and put in practical use. Software is updated to satisfy user's need, adapted to accommodate changes in external environment. Maintenance is carried out to correct any errors that didn't detect in the previous early

stages. It also needs to enhance efficiency of system and improve system units. It used to collect, analyze and priority of user trouble. Maintenance needed because of new system installation and document changes (user's manual).

Prototyping is incorporate into waterfall model because it is vital to test out the functionality of its models of development. There are two types of prototyping namely requirements prototyping and design prototyping. Requirements prototyping is to ensure that the requirements are feasible and practical if there is not revisions are made at the requirements stage. While design prototyping helps the developers assess alternative design strategies and decide which is best for a particular project. Process gets into the implementation stage. This stage and prototype will also allow potential user to test out the system and necessary modification can be made before being implemented. Another reason why waterfall with prototyping approached was it offered menus of making the development process visible compare to other. Throughout this model, system interface built and tested as a prototyped. So user understands what the system will look like. Prototyping is useful for validation and verification. Validation is to ensure the system has implemented all requirements and building the correct product according to specification while verification is to check the quality of implementation.

Prototyping is a sub-process that enhances understanding. A prototype is a partially developed product or a simple simulator of the actual system that enables customers and developer to examine some aspect of the proposed system and decide whether it is evitable or appropriate for the finished product.

Benefits of waterfall model with prototyping:

i) Simplicity of explanation

ii) Systematic and organized

iii) More other models are establishment of it

iv) It makes explicit which intermediate products are necessary to begin the next stage of development

Important of Prototyping:

i) To ensure the system meet the requirement

ii) To help the developers and assess alternative design strategies and make best decision for particular project.

iii) To ensure the requirements are consistent, feasible, and practical.

iv) To help user to understand the system

v) To help designer to know the interaction between user and the development system.

3.1.3 Spiral Model

Spiral model (*http://en.wikipedia.org/wiki/Spiral_model*, 2/7/2004) is an idea being used to minimize the risk. A simplified looking at it is a waterfall model with each phase preceded by risk analysis. It emphasis on the alternative and constraints supports the reuse of existing software and the incorporation of software quality as a specific objective. In spiral model, process is represented as spiral rather than sequence of activities with backtracking.

Each loop in the spiral is split into 4 sections:

i) Objective setting

ii) Risk assessment reduction

iii) Development and validation

iv) Planning

In each spiral, it identifies potential risk and plan for the next phase based on the identified risk. There is no fixed specification such as design or analysis. It has been carried out until the errors are being validated. Prototyping may be used in one spiral to resolve requirements uncertainty and hence reduce risks. A common problem in software in software development is determined when the products of a specific phase have been adequately tested. But it can be used only for large-scale, in-house products. Developers have to be competent in risk analysis and risk resolution. This model is failed if risks are inaccurate defined.

3.2 Approaches on Information gathering

Several techniques have been utilized in order to conduct the information gathering as shown below:

i. Brainstorming / Discussion

During the requirements elicitation, discussions with the supervisor have been carried out in order to discuss about the requirements of the system and to gain some ideas, advices, recommendations, and information on the requirements and proceedings of the project. Abundance of ideas about the design and requirements of the system have been figured out the system. The discussion likewise exists within the partnership.

ii. Reading materials

A lot of published literatures have been read in order to gather information of the users' need, system development needs and technical

issues of the proposed system. All these can be categorized into printed material such as book and journal and non-printed material such as electronic document. Ideas are managed to get from books, magazines and journal through reading. These ideas can be implemented in the proposed system.

iii. Library

The library is the traditional source of information. In order to obtain skills of system development, the traditional reading strategy helped a lot. A lot of materials in the library such as journal, conference and reference books offer a relatively concise information and format for research. It does offer a good starting point intended for teaching and from which to find more detailed sources.

iv. Document Room

Another source for gathering information is document room in Faculty of Science Computer and Information Technology. Here some of the thesis that were in the past are focused to be relevant in the development of some of the report are useful in providing information regarding to the software, which can be used to develop the system.

Many thesis projects done by senior student are stored in the document room. Some of them are related to this project and provide guidelines very helpful to the presentation and report writing.

v. Internet searching

The Internet has become the indispensable source for searching any required general information. It has become one of the major sources for obtaining the latest information. Information can be gathered in the most cost effective and time efficient manner using Internet.

There are many related projects done by commercial companies or research institutes. These projects are published in the Internet, providing very useful information. Besides, several websites of software companies are visited to gather further information about the software and compare the software between each other in order to get the best solution for the system development.

vi. Survey Questionnaires

Survey questionnaires were being carried out in order to gain general views and feedbacks from academicians and researchers either within the campus or from the public. The survey questionnaires had been discussed, developed, tested and printed out for photocopying among ourselves before distribution to ensure their readability and understandability. The respondents were ensured of the confidentiality of the information given. The survey results were then being collected and analyzed in meaningful forms.

3.3 Client/Server Architecture

3.3.1 Definition

Client-server architecture is a versatile, message-based and modular infrastructure that is intended to improve usability, flexibility, interoperability and scalability as compared to centralized mainframe, time sharing computing. Client-server is a computational architecture that involves client processes requesting service from server processes. Client-server maintains a distinction between processes and network devices. Client-server architecture reduces network traffic by providing a query response rather than total file transfer. It improves multi-user updating through a GUI front-end to shared databases. As a result of the limitations of file sharing architectures, the client/server architecture emerged. This approach introduced a database server to replace the file server.

3.3.2 Two-tier Architecture

With two tier client/server architectures, the user system interface is usually located in the user's desktop environment and the database management services are usually in a server that is a more powerful machine that services many clients. Processing management is split between the user system interface environment and the database management server environment. The database management server provides stored procedures and triggers. There are a number of software vendors that provide tools to simplify development of applications for the two-tier client/server architecture.

The two-tier client/server architecture is a good solution for distributed computing when there are many users interacting on a LAN simultaneously. However, it

does have several limitations. The performance will deteriorate when the number of users is increased to a certain number. This limitation is a result of the server maintaining a connection via "keep-alive" messages with each client, even when no work is being done. Secondly, implementation of processing management services using vendor proprietary database procedures restricts flexibility and choice of DBMS for applications. Finally, current implementations of the two-tier architecture provide limited flexibility in moving program functionality from one server to another without manually regenerating procedural code.

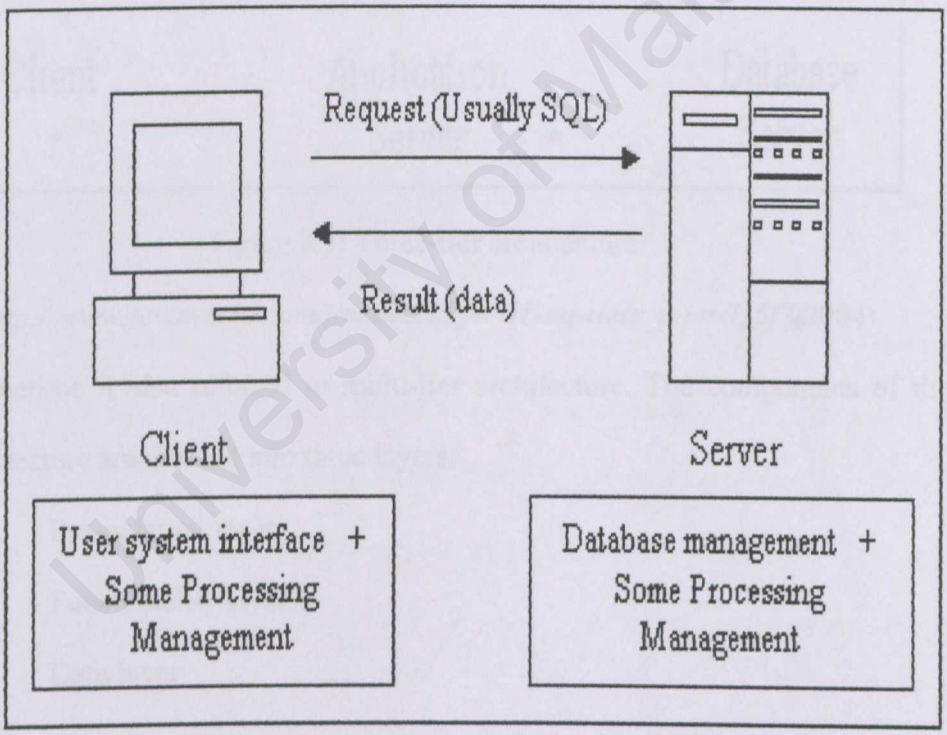


Figure 3.4: Two tier Client-server Architecture

(*http://www.neurauter.at//Diplomarbeit/html/node34.html*, 5/7/2004)

3.3.3 Three-tier Architecture

The three-tier architecture (also referred to as the multi-tier architecture) emerged to overcome the limitations of the two-tier architecture.

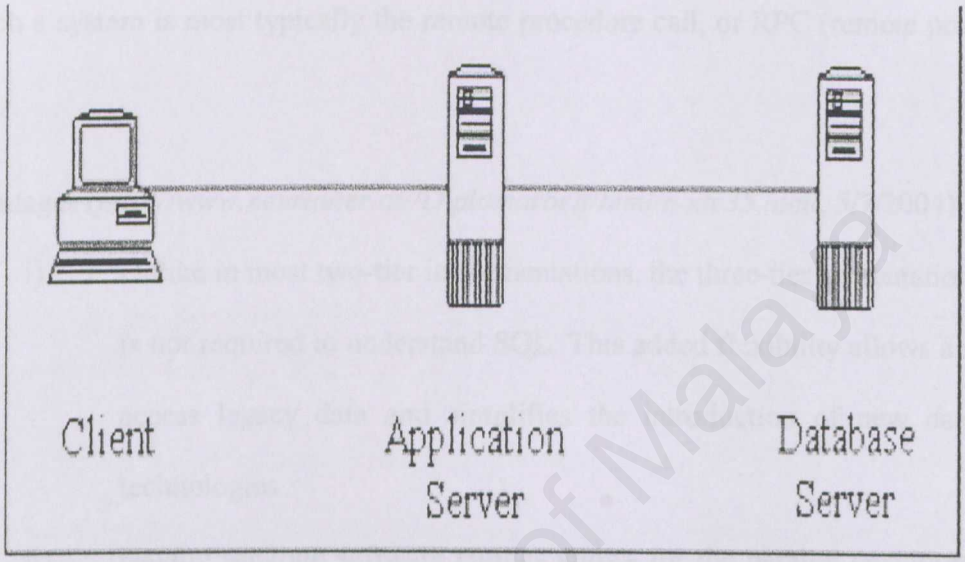


Figure 3.5: Three-tier architecture

(*http://www.javaworld.com/javaworld/jw-01-ssj-tiers_p.html*, 5/7/2004)

Sometime it also referred to multi-tier architecture. The components of three-tiered architecture are divided into three layers:

i) Presentation layer,

ii) Functionality layer,

iii) Data layer

Each of these layers must be logically separate. Presentation logic represents the user interface, for displaying data to the user and accepting input from the user. Business logic is for data validation, ensuring the data is correct before being added to the database. Data Access Logic represents the database Communication for accessing

tables and indices, packing and unpacking data. The three-tier architecture attempts to overcome some of the limitations of the two-tier scheme by separating presentation, processing, and data into separate distinct entities. Although three-tier systems can be implemented using a variety of technologies, the calling mechanism from client to server in such a system is most typically the remote procedure call, or RPC (remote procedure call).

Advantages (*http://www.neurauter.at//Diplomarbeit/html/node35.html*, 5/7/2004):

i) Unlike in most two-tier implementations, the three-tier presentation client is not required to understand SQL. This added flexibility allows a firm to access legacy data and simplifies the introduction of new data base technologies.

ii) Having separate software entities allows for the parallel development of individual tiers by application specialists.

iii) Provides for more flexible resource allocation. Middle-tier functionality servers are highly portable and can be dynamically allocated and shifted as the needs of the organization change. Network traffic may be reduced.

iv) Reusable logic reduces subsequent development efforts, minimizes the maintenance workload, and decreases migration costs when switching client applications.

v) The three-tier client/server architecture has been shown to improve performance for groups with a large number of users (in the thousands) and improves flexibility when compared to the two-tier approach.

3.4 Application Platform / Operating System

3.4.1 Operating System

An operating system (OS) is a set of computer programs that control the computer hardware and acts as an interface with application programs. An operating system is the program that loaded into the computer by a boot program, manages all the other programs in a computer. An operating system is the software that provides the interface between the hardware of a computer system and applications programs that are used on it. It performs a basic task such as recognizing input from the keyboard, sending output the display screen and keeping tracks of files and directory. OS make sure the different program running at a same time that does not interfere with each other. Besides, it provides security to ensure only authorized user can access the system. In addition, user can interact directly with the operating system through a user interface such as command language or Graphical User Interface (GUI). The most popular operating systems currently are UNIX, LINUX, Windows 98, Windows 2000 and Windows XP.

3.4.1.1 UNIX

UNIX is an increasingly popular operating system found on multi user installations. It is currently available on personal computers instead of used on minicomputers and workstations in the academic community traditionally. UNIX, like other operating systems, is a layer between the hardware and the applications that runs on the computer. It has functions that manage the hardware and functions that manage the execution of applications.

UNIX is an ideal platform for running mail servers, networked file systems and many more at a very low cost. UNIX users normally share processing time on a central computer or cluster or computers. This is a very cheap solution for a large number of users.

UNIX can be used for:

i. Storing files, including users personal files as well as publicly accessible software archives.

ii. Managing centralized databases and serving information to users remotely.

iii. Running a web server and storing web pages. The UNIX machines are normally left on 24 hours a day.

iv. Implementing shared network file systems. Although all users files may be stored on a single fixed connected to one particular computer, the files can still be accessed in a completely transparent way from any UNIX machine within the local network.

v. UNIX provides an environment for the controlled management of modules and courses. For example, simply copying files can collect project work; information and help can be mailed to specific groups or places on the World Wide Web. User quotas can also be set.

vi. The Common Gateway Interface (CGI) – CGI scripts can be set up so that programs on our machine can be executed across the World Wide Web. This allows information services to be provided in real time.

vii. Computers running UNIX normally support certain remote services, allowing users to request information from the computer without actually logging in. A good example of this is the "Remote Finger" command.

viii. All UNIX systems have a C compiler, and many other languages such as Prolog, Common Lisp and FORTRAN are available as well.

The benefits and weaknesses of UNIX can be concluded as the following: -

i. Benefits

a. UNIX is consistent in treating files. It is very easy for the users to work with files because users do not need to learn special command for every new task.

b. UNIX is not known only for its longevity and versatility as an operating system, but also for the variety and number of utility programs that called tool.

c. It is a powerful and mature operating system and network-based application.

ii. Weaknesses

a. UNIX needs very powerful workstations. Therefore it is not cost effective to use.

b. UNIX is very expensive.

3.4.1.2 LINUX

LINUX is a free Unix-type operating system (it looks like UNIX but doesn't come from the same source code base). LINUX is only the kernel of the operating system, the part controls hardware, manages files, separates processes and so forth. LINUX includes true multitasking, virtual memory, shared libraries, demand loading, memory management, Internet networking and other features.

Linux supports a wide range of software, from TeX (a text formatting language) to X (a graphical user interface) to the GNU C/C++ compilers to TCP/IP networking. It is well suited to function as a development environment for web applications. Its superior stability is a feature that cannot be beaten even by Windows. Linux is capable of running 24 hours 7 days a week without system failures or crashes. Memory management is dynamic and used memory is released after a particular application ends unlike Windows.

In addition Linux has the following features:

i. It is capable of multitasking.

ii. Has support for Netware clients and servers.

iii. It includes a LAN Manager/Windows Native (SMB) client and server.

iv. It is a multi platform that is it can run on any processor.

v. Many networking protocols supported.

vi. Has memory protection between processes ensuring that a program cannot crash the entire system.

Linux only weakness is a lack of support for hardware making it a little difficult to setup a machine with Linux. Fortunately support for Linux is growing every single day and more peripherals are being added to Linux list of supported hardware.

3.4.1.3 Windows 98

Windows 98 is an improved version of Windows 95 with many end user productivity features, improved support for newer hardware devices, and additional enhancement. Several improvements were made in Windows 98 to improve end user productivity. It also shortens the time takes for software application loaded from hard disc drive and system shut down also speeded up. In addition, it made simple access to Internet and providing better system maintenance and diagnostics. It also support for the latest graphics, sound and multimedia technologies and ability to add or remove peripheral devices.

3.4.1.4 Microsoft Windows 2000

Windows 2000 (W2K) is a commercial version of Microsoft's evolving Windows operating system and formerly known as Windows NT 5.0. Windows 2000 is designed to appeal to small business and professional users as well as to the more technical and larger business market for which the NT was designed. There are four products included in Windows 2000 product line namely: Windows 2000 Professional, Windows 2000 Server, Windows 2000 Advanced Server and Windows 2000 Datacenter Server. Windows 2000 is reported to be more stable than Windows 98/NT systems. A

significant new feature is Microsoft's Active Directory that enables a company to set up virtual private networks to encrypt data locally or on the network and to give users access to shared files in a consistent way from any network computer. This operating system also designed to provide high reliability, interoperability, with high-level security and significant enhancements for laptop users, application support, hardware support and many more.

3.4.1.5 Windows XP Professional

Windows XP is the latest version of the Windows desktop operating system for the PC and is the most important version of Windows since Windows 95. Windows XP is built on the Windows 2000 kernel but brings a new, more personalized look to the desktop that will also make it easier for users to scan or import images and to acquire music file on the Web and transfer them to portable devices. Windows XP comes in a Professional version and a Home Edition version. American Institutes for Research conducted usability evaluations of Microsoft's Windows 2000 Professional and Windows XP Professional operating systems in June 1999 and July-August 2001, respectively. The results of the studies suggest that overall the Windows XP interface is an improvement over the Windows 2000 interface.

Pros:

i. Windows XP more reliable, it is more easily recover from system problems.
ii. Windows XP is easy to use due to its intuitive, task-based design.
iii. Encrypting File System provides a high level of protection of with a randomly generated key.

iv. Windows Messenger provides an easy way to communicate and collaborate in real time on user's computer.

v. System Restore features enable user to revert the system to a previous state when something goes wrong in computer.

Cons:

i. Sharing XP with more than one machine in the house is not acceptable.

ii. Some software and hardware won't operate under XP without updated patches or drivers.

3.5 Programming Language

Programming languages is a language used to write instructions for the computer. The programming tool is the main tool in developing the system.

The tools should:

a) Enable the run on any platform.

b) Support to create a high impact graphical user interfaces.

c) Be able to create professional looking installation packages for the application.

3.5.1 VB Script

VB Script is a command language that embedded in an HTML document. VB Script is a member of Microsoft VB family of development products which known as a scripting language for HTML pages. VB scripts are very familiar to VB programming

language which means VB scripts are easy to learn by VB programmer. VB Script is a scripting language that can enhance HTML. It is a script that provides web authors a way to write small scripts that would execute on user's browsers instead of on server. Besides, users don't need to send their data to sever until it verified to be corrected. It can improve performance of the browsing session by performing data checks locally and reduce network bandwidth either over the Internet or Intranet. Microsoft had tool safety and security of client machines consideration information into account where creating VB Scripting. Potentially dangerous operations that can be done in VB have been removed from VB Scripting including the capability to access dynamic link libraries directly and to access the file system. One of the coolest features of VB Script is its programming capabilities of VB Script to decide what should appear on the page and how it should appear.

3.5.2 JavaScript

The JavaScript language was developed by the Netscape Communications Corporation and is a trademarked name. It is a cross-platform, object-based scripting language that was originally designed for use in Netscape Navigator. Indeed, versions 2.0, and later, of Navigator can interpret JavaScript statements that are embedded within HTML code.

Pros (*http://www.mediacollege.com/internet/javascript/pros-cons.html*, 8/3/2005):

i. Speed. Being client-side, JavaScript is very fast because any code functions can be run immediately instead of having to contact the server and wait for an answer.

ii. Simplicity. JavaScript is relatively simple to learn and implement.

iii. Versatility. JavaScript plays nicely with other languages and can be used in a huge variety of applications. Unlike PHP or SSI scripts, JavaScript can be inserted into any web page regardless of the file extension. JavaScript can also be used inside scripts written in other languages such as Perl and PHP.

iv. Server Load. Being client-side reduces the demand on the website server.

Cons (*http://www.mediacollege.com/internet/javascript/pros-cons.html*, 8/3/2005):

i. Security. Because the code executes on the users' computer, in some cases it can be exploited for malicious purposes. This is one reason some people choose to disable JavaScript.

ii. Reliance on End User. JavaScript is sometimes interpreted differently by different browsers. Whereas server-side scripts will always produce the same output, client-side scripts can be a little unpredictable. Don't be overly concerned by this though - as long as you test your script in all the major browsers you should be safe.

3.5.3 Hypertext Markup Language (HTML)

HTML is a layout language. It contains commands that, like a word processor, tell the computer – in a very loose sense – what the content of the document is. Using HTML, we can tell the computer that a certain document contains a paragraph, a bulleted list, a table, or an image. The HTML rendering engine is responsible for displaying the text and images on the screen. The difference between HTML and word processors work with proprietary formats, therefore one word processor cannot directly

read another word processor's file format – they usually need a special program, called an import/export filter, to transfer one file format to another. [3]

In contrast, HTML is an open, worldwide standard. If you create a file using the commands available in version 3.2 or earlier, it will display on almost any computer with any operating system – anywhere in the world.

Why HTML:

i. It provides millions of people with access to information online that they could not or would not have seen any other way.

ii. HTML is the first easy method for non-programmers to display text and images on-screen without limiting the audience to those who own or have access to the same program (or a viewer) that the author used to create the content.

iii. In addition, browsers are universal content viewers and HTML is the universal file format, which helps universalizing the display of any output of information.

The limitation of HTML

i. Plain HTML has no way to specify the exact position of content on a page, either horizontally, vertically, or along the z-axis, which controls the layers in which objects appear.

ii. HTML is not a programming language, thus it has no decision-making capabilities.

iii. HTML is a fixed or static language. Therefore, the limited command set forces developers to build proprietary extensions to perform more advanced functions.

3.5.4 Active Server Page (ASP)

ASP (Active Server Pages) is a technology developed by Microsoft. Pages using ASP are primarily developed in JavaScript or VBScript and are integrated into the HTML of your Web pages. The ASP code is compiled on-the-fly by the server and the resulting output is standard HTML. By using ASP, Web pages can be dynamic, full of ever-changing content, and browser independent.

Pros (*http://les1.man.ac.uk/course/asp/material/aspcourse.ppt*, 8/3/2005):

i. Easy to develop applications (When deadlines are tight)

ii. No extra software required (Comes with web server)

iii. Powerful and flexible (Excellent database integration)

iv. Browser independent (All server side)

Cons (*http://www.vbip.com/books/186100222X/chapter_222x_04.asp*, 8/3/2005):

i. Inherent limitations of scripting languages

ii. Insecure nature of text-based scripting

iii. Performance of interpreted scripting

iv. Limited transactional participation

3.5.5 Java Server Page (JSP)

Java Server Page (JSP) is a technology for controlling the content or appearance of Web pages through the use of servlets, small programs that are specified in the Web page and run on the Web server to modify the Web page before it is sent to the user who requested it. Java Server Page (JSP) is a template for a web page to that uses Java code to generate an HTML dynamically. JSP has been referred as the Servlet Application Program Interface (API) by the developer of Java. JSP is comparable to ASP technology. There are some similarities between ASP and JSP. Firstly, they both make use of simple server-side scripting to provide access to Web server information and functionality. They both using object oriented scripting and started out with similar styles of delimiting this scripting from a page's content. Difference between ASP and JSP is a JSP calls a Java program that is executed by the Web server, meanwhile an ASP contains a script that is interpreted by a script interpreter (such as VBScript or Jscript) before the page is sent to the user.

(*http://java.sun.com/developer/onlineTraining/JSPIntro/contents.html#JSPIntro0*, 8/7/2004).

Advantages:

i. The dynamic part is written in Java, not Visual Basic or other MS-specific language, so it is more powerful and easier to use.

ii. It is portable to other operating systems (platform independent) and non-Microsoft Web servers. It is able to reuse component by using JavaBeans and EJB.

3.6 Web Server

Web server increasingly become feature sets bundled with an operating system. The choice web server will ultimately depend on which platform has been selected. The universality of TCP/IP networking means that we can mix other server but this may not be the best use of our resources. The platform on operating system chosen for the web server should be one that we are already familiar. Web server use SSL to support encryption that can be protected against unwanted access. All the products handle security admirably except for apache, whose public domain version does not support SSL.

3.6.1 Apache

The keys to Apache's attractiveness and popularity are instead of the qualities listed above and its extensionality, its freely distributed source code and active user support for the server. Among the most notable features are its cross-platform support, protocol support (HTTP), modularity (API), security, logging and overall performance and robustness. Apache runs on Windows 95/98/NT and the entire major variants of UNIX. Apache distributes a set core of modules that handle everything from user authentication and cookies type correction on URLs. Apache overall security, performance, robustness are unquestionable. Many of the most accessed sites on the world run Apache. Apache offers neither browser-based maintenance capability nor GUI configuration/administration tools. Apache's robust design and extensibility, coupled with its freeware status and the availability of its source code to the public, make

Apache a good choice for enterprise-level web sites and for individuals ad workshop that use UNIX a combination of UNIX and NT platform.

3.6.2 Internet Information Services 6.0 (IIS 6.0)

It is a group of Internet Servers (including web or Hypertext Transfer Protocol (HTTP) server and File Transfer Protocol (FTP) server) with additional capabilities for Microsoft's Windows NT and Windows 2000 server operating system. IIS is a Microsoft's entry to compete in the Internet server market that is also addressed by Apache, Sun Microsystems, O'Reilly and others. With IIS, Microsoft includes a set of programs for building and administering web sites a search engine and a support for writing web-based applications that access databases. Microsoft points out that IIS is tightly integrated with the Windows NT and 2000 servers is a number of ways, resulting in faster web page serving.

3.7 Web Browser

3.7.1 Internet Explorer 6.0

Internet Explorer 6 is a set of core technologies in Microsoft Windows XP Home Edition and Windows XP Professional operating systems that provides enhanced privacy features and a flexible and reliable browsing experience for users of Windows XP, Windows Millennium Edition (Windows Me), Windows 2000, Windows 98, and Windows NT® 4.0 with Service Pack 6a or later.

Whether you are a home user browsing content or getting e-mail on the Web, an IT administrator deploying and maintaining a rich set of Windows Internet technologies,

or a Web developer creating Web content, Internet Explorer 6 gives you the freedom to experience the best of the Internet.

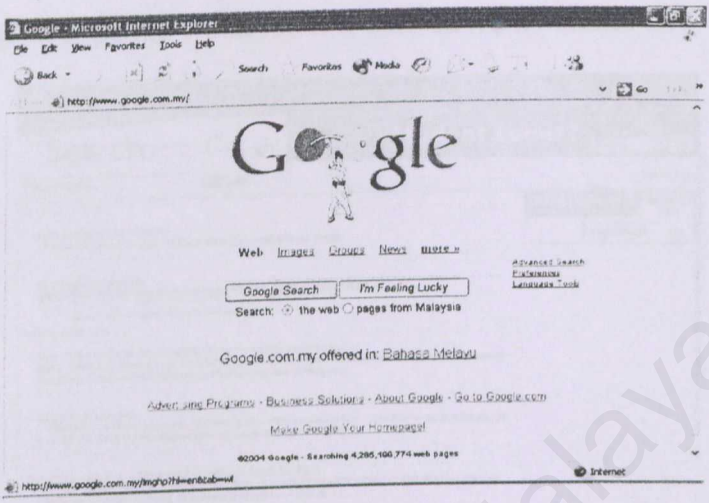


Figure 3.6: Internet Explorer Screenshot

Pros:

i. It incorporates media player in its "media bar" for playing videos and music.

ii. IE6 has good support for XML and XHTML.

iii. IE comes with a lot of plug-in ready installed.

iv. Fault collection services of IE 6.0 help identify potential problems that need to be fixed in future Internet Explorer Service Packs.

Cons:

i. IE6 does not support for java

ii. IE6 is not available on Linux or UNIX.

iii. Supports for some picture formats such as .png are still poor.

3.7.2 Netscape 7.2

Netscape has updated its Internet suite to version 7.2. This new version offers many improvements since the previous release, including improved standards support and better control over popup windows. It is derived from Mozilla 1.7.

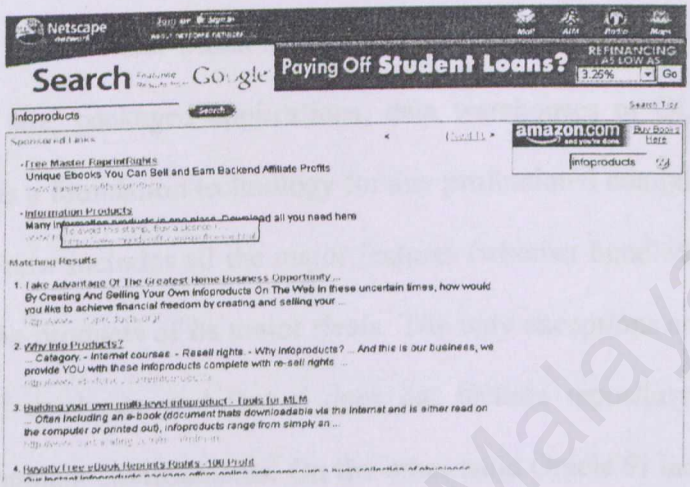


Figure 3.7: Netscape Screenshot

Pros:

i. Popup Window Controls have been improved to block mouseover pop-ups and limit the number of pop-ups when popup window controls preference is set to off.

ii. Password Manager allows you to display saved passwords.

iii. Improvements to Palm Sync.

iv. Table Editing controls in Composer.

v. New Macromedia® Flash 7 plug-in for Windows.

vi. Improvements in browser rendering speed and application start-up.

vii. Improvements in standards support.

Cons:

i. Message templates are weak.

ii. Custom message filters are not flexible enough.

3.8 Database Server

3.8.1 Oracle 9i

Oracle is the world's leading vendor of database software and has the distinction of being the first company to create and sell a commercial RDBMS that used SQL. Oracle database is the most scalable and full-featured database available. Whether driving the web site, packaged applications, data warehouses or OLTP applications, Oracle Database is a foundation technology for any professional computing environment.

Oracle 9i now includes all the major features (whether bundled or optional) that are available in the products of its major rivals. The only exceptions are that it does not support federated databases and that it does not include repository capabilities for supporting development environments. On the other hand Oracle 9i includes significant parts of a content management solution, which will be useful for those that wish to build their own solution in this area rather than buy a packaged product.

Below are the key facts of Oracle 9i:

i) Oracle 9i now includes comparable facilities to both its major rivals in the business intelligence arena. That is, it now includes OLAP, ETL and data mining tools within the product offering.

ii) It consists of advanced partitioning options which are the new feature of the database management system.

iii) XML may be parsed prior to storage. This will reduce query overheads which would otherwise require real-time parsing as a part of the query process.

iv) Real Application Clustering is particularly powerful. However, it competes with the federated database capabilities offered by its major rivals.

v) Oracle has provides content management support directly from the database.

vi) Oracle 9i consists of Internet File System feature. The true significance of this was, arguably, overlooked when it was introduced in 8i. Now it is clear that it enables a transparent consolidation capability in a particularly attractive manner.

3.8.2 Microsoft SQL Server 2000

Microsoft SQL server 2000 is a single process, multithread relational database server primarily intent for transactional processing. SQL Server 2000 provides agility to company data management and analysis, allowing organization to adapt quickly and gracefully to derive competitive advantage in a fast-changing environment. From a data management and analysis perspective, it is critical to turn raw data into business intelligence and take full advantage of the opportunities presented by the Web. It is based on the client/server architecture, which divides processing into two components: a frond-end or client component, that run on a local workstation and a back-end or server component, which runs on a remote computer.

(*http://doc.ddart.net/mssql/sql2000/html/architec/8_ar_cs_20yt.htm*, 8/7/2004).

3.8.3 Microsoft Access 2003

Microsoft Access 2003 provides a powerful set of tools that are sophisticated enough for professional developers, yet easy to learn for new users. Create or use powerful database solutions that make organizing, accessing, and sharing information easier than ever.

Pros(*http://www.amazon.com/exec/obidos/ASIN/B0000AZJV4/102-2610395-6721706*, 8/3/2005):

i. Supports a variety of data formats, including Extensible Markup Language (XML), OLE, Open Database Connectivity (ODBC), and Microsoft Windows SharePoint Services.

ii. Access data from multiple databases in forms, reports, and data access pages, linking tables from other Access databases, Microsoft Excel spreadsheets, ODBC data sources, Microsoft SQL Server databases & other sources.

iii. Stored Procedure Designer creates & modifies procedures stored in SQL Server, without requiring you to learn Transact-SQL.

iv. Quickly find tables, queries, forms or reports that depend on a particular database object update properties automatically.

CHAPTER 4 - SYSTEM ANALYSIS

4.1 System Requirement Analysis

Requirement analysis is an important process to determine the system being built in order to meet the customer's requirements. There are two types of requirement, namely functional requirement and non-functional requirement. To define and elicit user's requirements, effective and appropriate techniques have been used to gather needed information for this project. A research method such as Internet research, document review and research on sample thesis and reference books has been used.

4.2 Functional Requirement

Functional requirement is a statement of the service or functions that a system should provide how the system reacts to particular inputs, and how the system should behave in particular situations. This Online Survey System consists of 3 sections namely user, respondent and administration.

4.2.1 User section

i. Registration module

The module implements a password protected web site for authorize access for valid user. The user must register before they start to use the system. The system will validate user's password before they log in to the system.

ii. Question designing module

The module allows the user to do specific function such as:

a) Create a new question and add it to database.

b) Editing the existing questions.

c) Delete questions for own design survey only.

d) Send invitation mail to the respondents and attach the hyperlink in the email to direct them to the survey.

iii. Database management module

a) Users can create their own respondent list to facilitate sending survey. They can add, edit, or delete the respondent in database.

iv. Report generator module

a) Able to generate analysis report by using the existing data.

4.2.2 Respondent section

i. Survey answering module

They can direct to the survey by clicking on the hyperlink in the email. They can submit the survey form easily by just one mouse click.

4.2.3 Administration section

The module allows the administrator to manage the user, respondent and survey. The system can add, edit user details or delete user from the system. The same functions are required for managing the respondent and survey.

4.3 Non-functional Requirement

Non-functional requirement are the constraints under which a system must operate and the standards and restrictions, which must be met by the delivered system. These requirements are as important as functional requirement. These non-functional requirements are:

4.3.1 Reliability

Data and information provided by the system must be reliable. It is an important factor for a system because reliability is the core objective to be achieved by a system. The system should convince the user with reasonable explanation that the information or recommendation it provides is reliable. It should also posses only authorized user can enter and access the evaluation form and do modification on the system.

4.3.2 Security

The system shall be secure from unauthorized access. Security of this system is very important to minimize the risk of data exposure to unauthorized user.

4.3.3 Maintainability

The system should be easy to maintain by system developers in order to add in new data or information. It should also develop a maintainability system with easy and simple maintenance procedure because user requirements may be change over time. It should also provide facility, which allow user to inspect their personal data and to correct them.

4.3.4 Robustness

Robustness refers to the ability of the system to continue in operation despite facing unexpected problems. Online survey system is able to process unanticipated errors by having validation for the input field on the client side before it is sent to the server and saved in database. For instance, a user may accidentally key in alphabets instead of numeric for date. Thus, the system can validate this input before sending to the server. When error is detected, the system will prompt an error message to the user.

4.3.5 Performance

This system should provide ability to generate an accurate analysis report. It should also be able to handle the respondents at a same time. It is also a critical to make the response time for the system as fast as possible. The display time for the survey questions must as short as possible. If the download time is too slow, the respondents will not be interested in doing the survey form anymore.

4.3.6 On Time

The system should be developed according to the schedule so that the final product can be delivered before the deadline. All the requirements and system analysis should be completed in time.

4.3.7 Portability

The system should be portability enough so that it can be used in different types of platform and enable anyone to access to the web site anytime and anywhere.

4.4 Methodology Choosing and Justification

After having brief studies on three (3) process models that under consideration in Chapter 3, Waterfall Model with Prototyping is chosen based on its several convincing reasons that supports and routing throughout the whole developing progress of OSS system.

i. Theoretically, one development stage should be completed before the next begins. In overall, this proposed methodology presents a very high-level view of what goes on during development, and it suggests me the sequence of events that I expect to encounter. However, in practice, these stages overlap among on and another, and feed information to each other. For example, during design stage, problems with requirements definition would be identified; during coding stage, problems related to system design would be encountered. Therefore, it is more suitable to say that an application system development process is not a simple linear model but involves a sequence of repetition of the activities.

ii. Associated with each process activity will be milestone and deliverables, so that I can use the model to estimate how close the project is to complete at a given point in time.

iii. In addition, this model is expected to help me lay out what the system needs to do in an order way. Its straightforwardness and simplicity make it easy to explain to others who are maybe not very familiar with the OSS system development.

iv. Prototyping conducted concurrently with the requirements analysis and definition stage in the initial stage of the development life cycle, effectively helps me ensuring the developing system time to time that it always meets its definition of needs and is feasible enough. If any error or inappropriate concept and definition found during the early stage, correction and improvement will take place immediately. It is therefore able to avoid or at least reduce cost of changing the whole testing stage when everything almost comes to the final stage.

4.5 Client / Server Architecture Choosing and Justification

Three-tier architecture was chosen in this project due to its most practical and suits the systems tremendously. It has many advantages compare with two-tier architecture

i) Separating of the functionality and data layer make it easier to implement.

ii) The added modularity makes it easier to modify without affecting other tiers.

iii) The ability to support transaction by a huge number of users on the server at the same time

4.6 Development Tools Choosing and Justification

4.6.1 Application Platform / Operating System

After do the investigation on platforms, Windows XP has been chosen as a platform used for OSS because Windows XP Professional is an improvement on

Windows 2000 Professional and it is stable to use. Here are the some advantages to use Windows XP:

i) Easier and faster to use compare with the earlier version of Windows:

- Windows XP make to easier to find information and programs and faster establish of tasks such as customizing computer settings, using and printing files and documents.

ii) Perform faster startup performance:

- It is average 34% faster than Windows 2000 and 27% faster than Windows 98 SE.

iii) Stability:

- Windows XP delivers a new level of stability, so that user can focus on their job. For example, if one the program was crashes, the other program can still running.

iv) Security:

Security is one of the significant factors to reduce cost by avoiding the productivity losses caused by viruses, worms or hackers. A good security also can reduce loss of revenue due to unplanned outages.

v) Memory and Performance:

In systems that include the recommended memory requirement of 128 megabytes of RAM, Windows XP is consistently superior to previous versions of Windows.

4.6.2 Programming Language

Active Server Page (ASP) is chosen due to its flexibility and usability as well as its feasibility to merge with scripting languages such as VBScript and JavaScript.

4.6.3 Web Server

Internet Information Server 6.0 (IIS 6.0) has been chosen as a web server for this project because of:

i. Easy to install and uninstall

ii. Accessible since all kind of browser can work with it

iii. Provides capabilities for secure transaction with the Secure Socket Layer (SSL) support and also authentication

iv. Windows-based Web authoring and development tools are supported

v. Integration with existing industry-standard database

vi. Allows for hosting multiple sites

vii. Offers a superb platform for building sophisticated Internet applications

4.6.4 Web Browser

Internet Explorer 6.0 chosen as the main web browser for uploading the system to be built due to its availability in the operating system being chosen and its worldwide use. Besides, any system that runs in the IE 6.0 can perform well in most of the web browsers, such as Netscape.

4.6.5 Database Server

Microsoft Access 2003 is chosen based on its noticeable strong points and less expensive in maintenance aspects as compared to Oracle 9i and Microsoft SQL Server 2000.

4.7 Development Requirement

4.7.1 Hardware Requirement

Table 4.1 Hardware Requirements

Server	Client
i. Intel Pentium III 450 MHz or above. ii. RAM at least 128MB or above iii. 20GB Hard Disk or above iv. 56K Modem / Network card NIC 10/100 v. Other standard peripherals	i. Intel Pentium III 450 MHz or above ii. RAM at least 128 MB or above iii. 2.0GB Hard Disk or above iv. 56K Modem / Network card NIC 10/100 v. Other standard peripherals

4.7.2 Software Requirement

Table 4.2 Software Requirements

Server	Client
i. Microsoft Windows XP Professional ii. Internet Explorer 6.0 iii. Microsoft Access 2003 iv. Web technology: ASP Scripting language: VBScript, JavaScript	i. Microsoft Windows 98 or later ii. Internet Explorer 5 and above

CHAPTER 5 SYSTEM DESIGN

5.1 Introduction

Design plays a significant role and is a meaningful engineering representation of something that is to be built. System Design is a phase of the waterfall where the entire requirements for the system are translated into system characteristics. The requirements for system are regarding to the analysis that had been discussed in the previous chapter.

At each stage, software design work products are reviewed for clarity, correctness, completeness and consistency with the requirement and with one and another in determining the success of a software project. System design includes the following issues:

i. System Architecture Design
ii. System Functionality Design
iii. User Interface Design
iv. Database Design

5.2 Overview of System Architecture

The architectural design process is concerned with establishing a basic structure framework for the online survey system. It involves identifying the major components of the OSS and the communications between these components. The conceptual architecture of the three-tier application applies when we split an application across three tiers are split into three logical components of the application: user interface,

computational logic and data storage. In reality, the three-tier Web applications generally consist of a Web browser for the user interface, a Web server connected to a "middle tier" application, and a persistent store that is frequently a relational database. (Refer to Figure 5.1). 3-tier allows any part of the system to be modified without change to other two part of the system. The main purpose of having three-tier architecture is to assign main functionality to each tier to ensure no function overlapped. Different people could handle each tier using different languages. Therefore, whenever there is error or system fault occurs, the problems can be detected and fixed easily without interrupting other tier.

The client-server architecture, which shows how data and processing are distributed across a range of processor, has three major components:

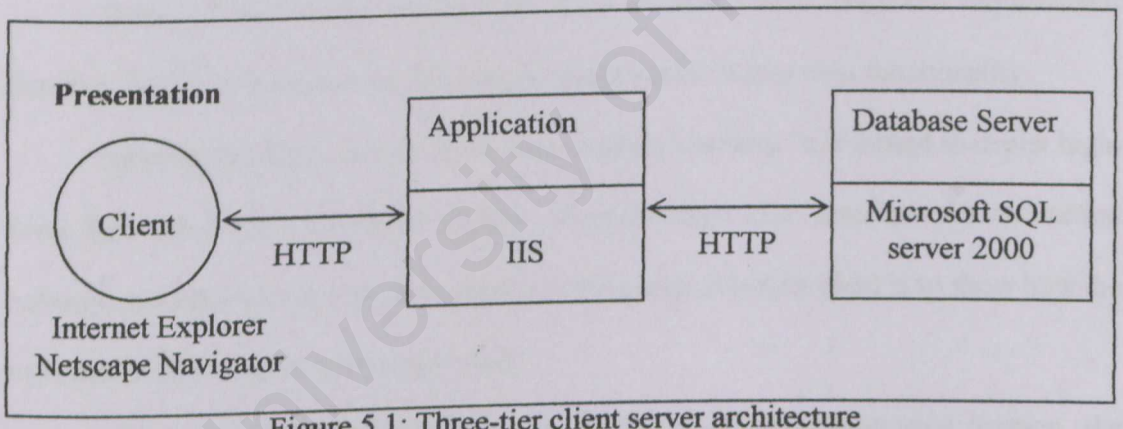


Figure 5.1: Three-tier client server architecture

The first tier is a client where all the application needed is organized. The client-tier will apply the browser like Internet Explorer and Netscape Navigator. It's simply for running the presentation software. To display the user interface (web page) to the user, the browser in this system is used.

The application server is the middle tier in OSS. Internet Information Server (IIS) in this system is responsible to manage the data. IIS interact with database sever to process the request from client and return the required result in the web page format.

The MS SQL server 2000 is acts as database server in OSS. It is responsible to maintain the data repository. Three-tier architecture in this system is used to allow the information transfer between the database server and web server to be optimized. In handle information retrieval from the database, the query is used. The results will then be passed back to the application server.

5.3 System Functionality Design

5.3.1 System Structure Charts

System functionality designs are based on the system functional requirements listed in chapter 3. It translates the system requirements into system functionality.

Structured chart is based on the functionality modules. It is issued to depict high-level abstraction on a specified system. Structure chart also describes the interaction between modules in a system. The objective of system structure chart is to show how the modules in OSS are related to each other.

OSS consists of three major parts, which are the Administration Section, the User Section and the Respondent Section.

The OSS is decomposed to the following modules:

1. Administration section
    a) Data management module
        I. Manage user
        II. Manage respondent
        III. Manage questionnaire
2. User Section
    a) Registration module
    b) Question designing module
    c) Survey distribution module
    d) Data management module
3. Respondent Section
    a) Survey answering module

Each module is further divided into sub-modules. By using graphical representation rather than process or narrative, it is very effective in presenting the system structure.

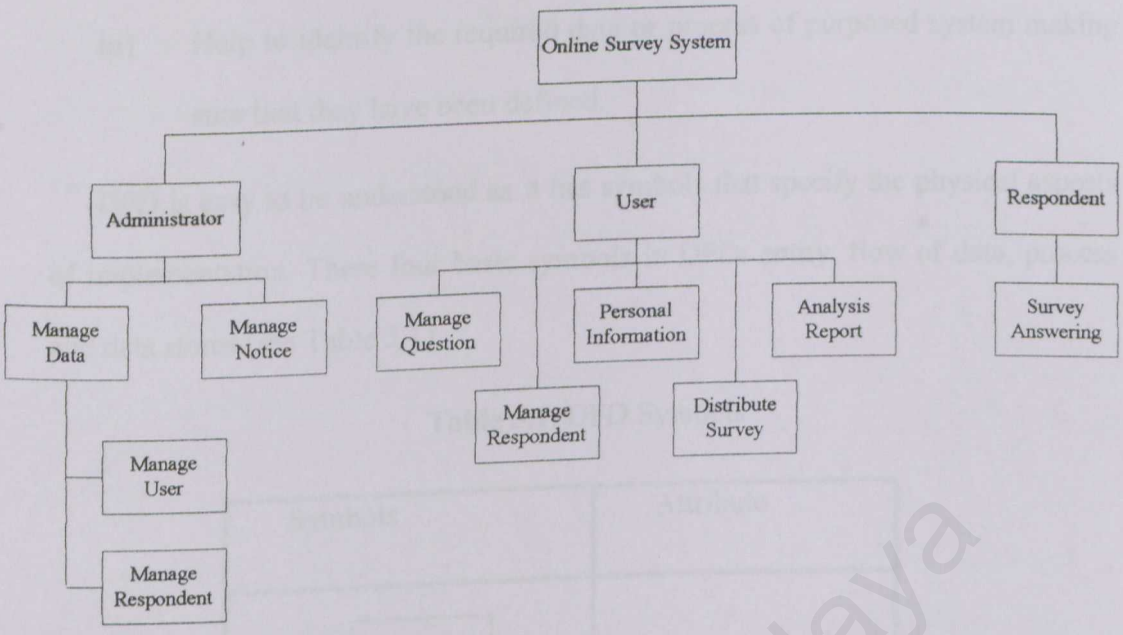


Figure 5.2: Structured chart of Online Survey System.

5.3.2 Data Flow Diagram (DFD)

A data flow diagram (DFD) is a tool that depicts the flow of data through a system and the work or progressing performed by that system. (Whitten, Jeffrey L, 2001). Data Flow Diagram (DFD) is also a method used to graphically characterize data processes and flows in OSS. DFD will depict the overview of the system inputs, process and outputs.

The advantages of using DFD are:

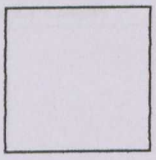
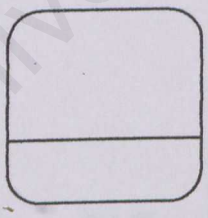
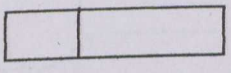
i) Provide better understanding of the interrelatedness of modules and sub modules of OSS.

ii) Analysis of a proposed system to determine if the necessary data and processes have been defined.

iii) Help to identify the required data or process of purposed system making sure that they have been defined.

DFD is easy to be understood as it has symbols that specify the physical aspects of implementation. There four basic symbols in DFD: entity, flow of data, process and data stores (see Table 5.1).

Table 5.1: DFD Symbols

Symbols	Attribute
	Entity
	Flow of Data
	Process
	Data Store

C.Gane and T.Sarson base the convention, which is used to design DFD on the work. The data flow is conceptualized with a top-down perspective. So, the Context Level Diagram will be drawn, followed by the Diagram 0. Diagram 0 is an overview process of all the major modules in ELONS that includes all the data stores, entities and process involved.

5.3.2.1 Context Diagram

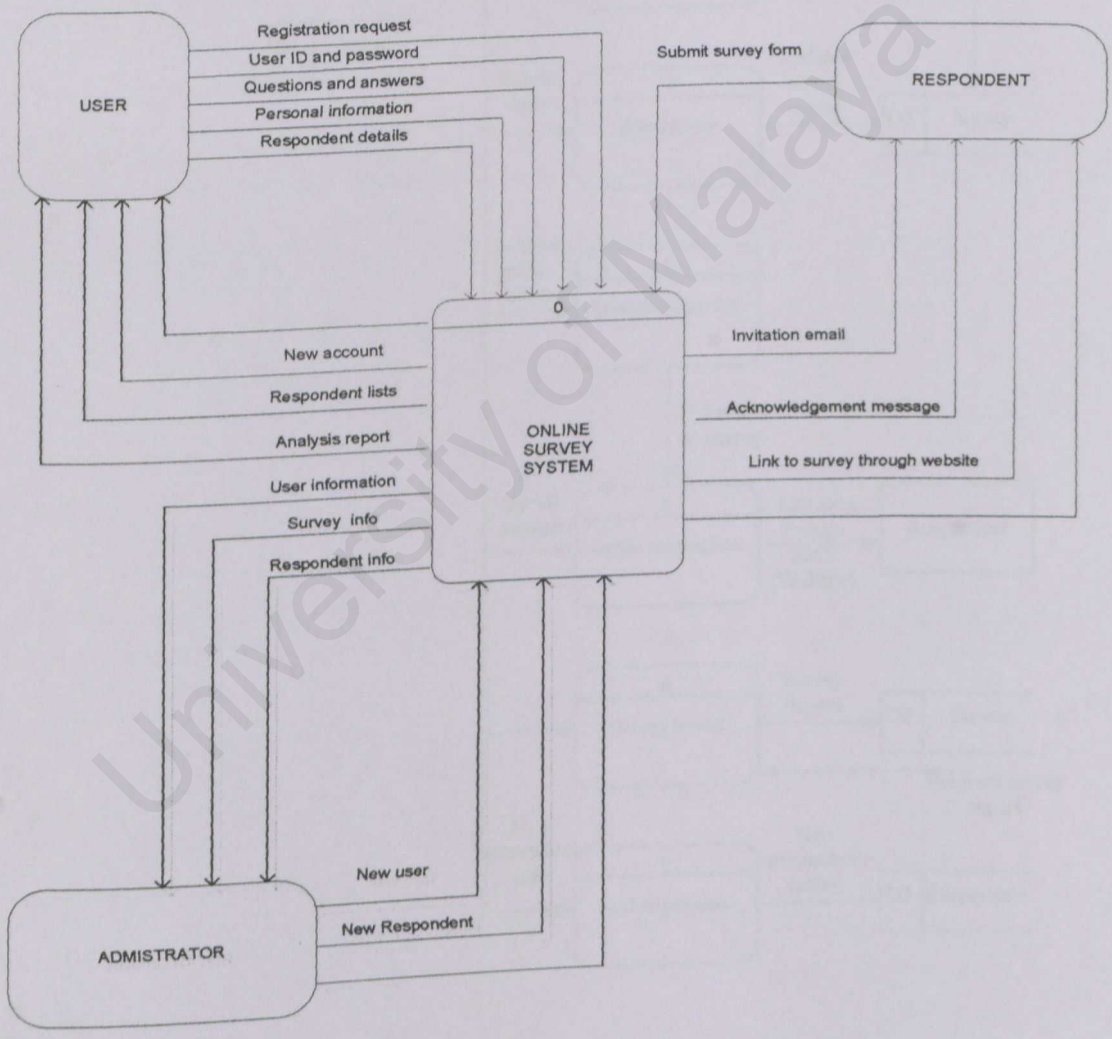


Figure 5.3: Online Survey System Context Diagram

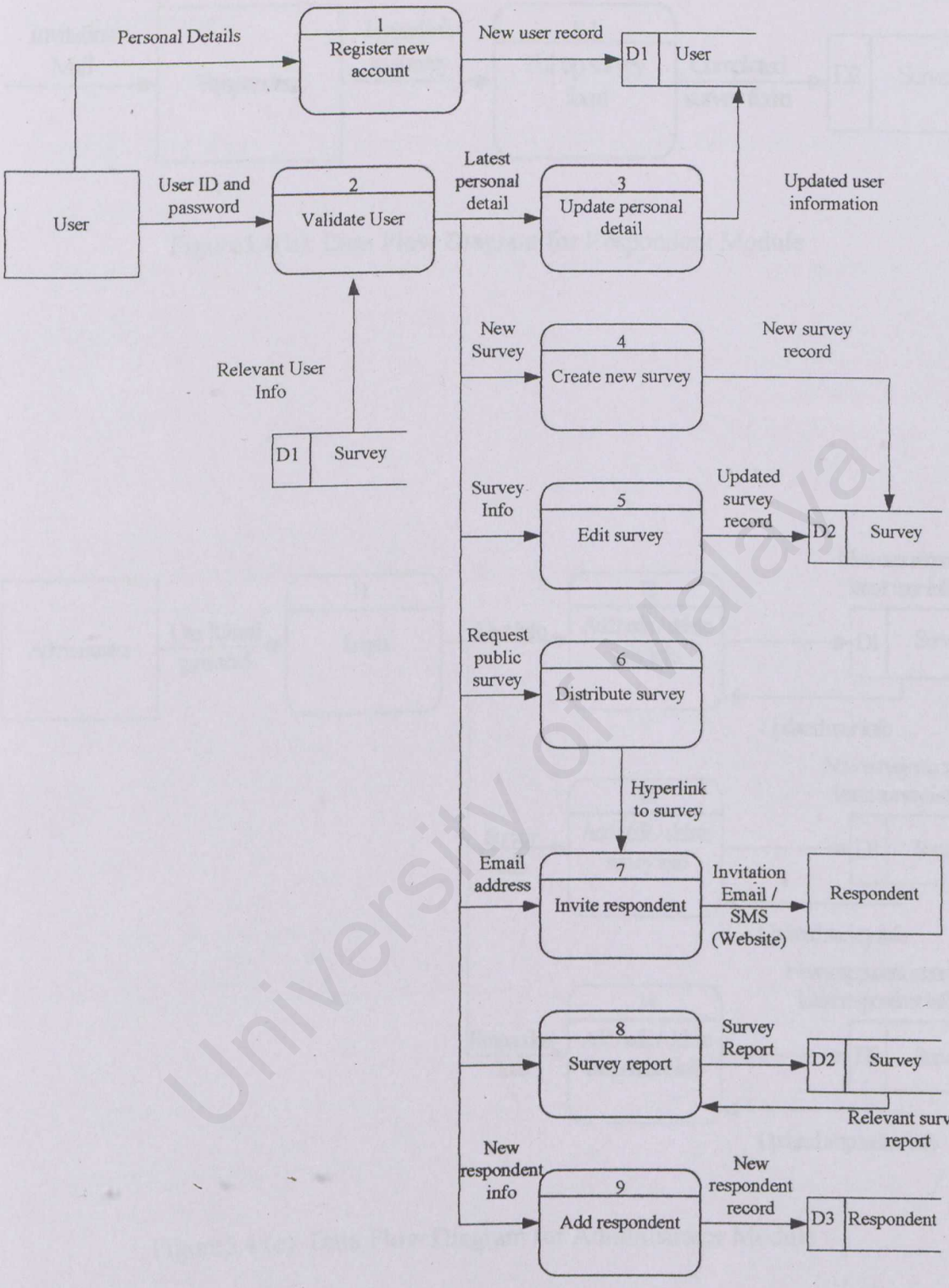


Figure 5.4(a): Data Flow Diagram for User Module

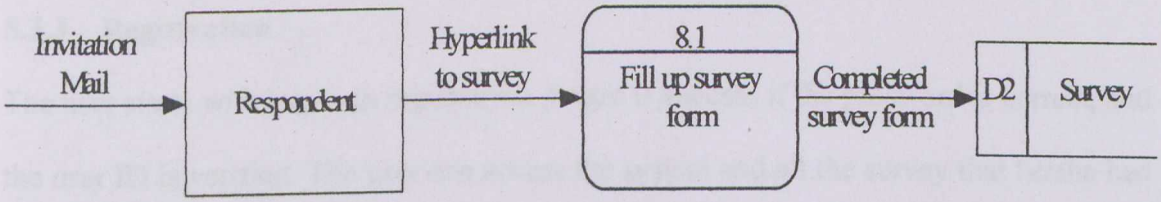


Figure5.4(b): Data Flow Diagram for Respondent Module

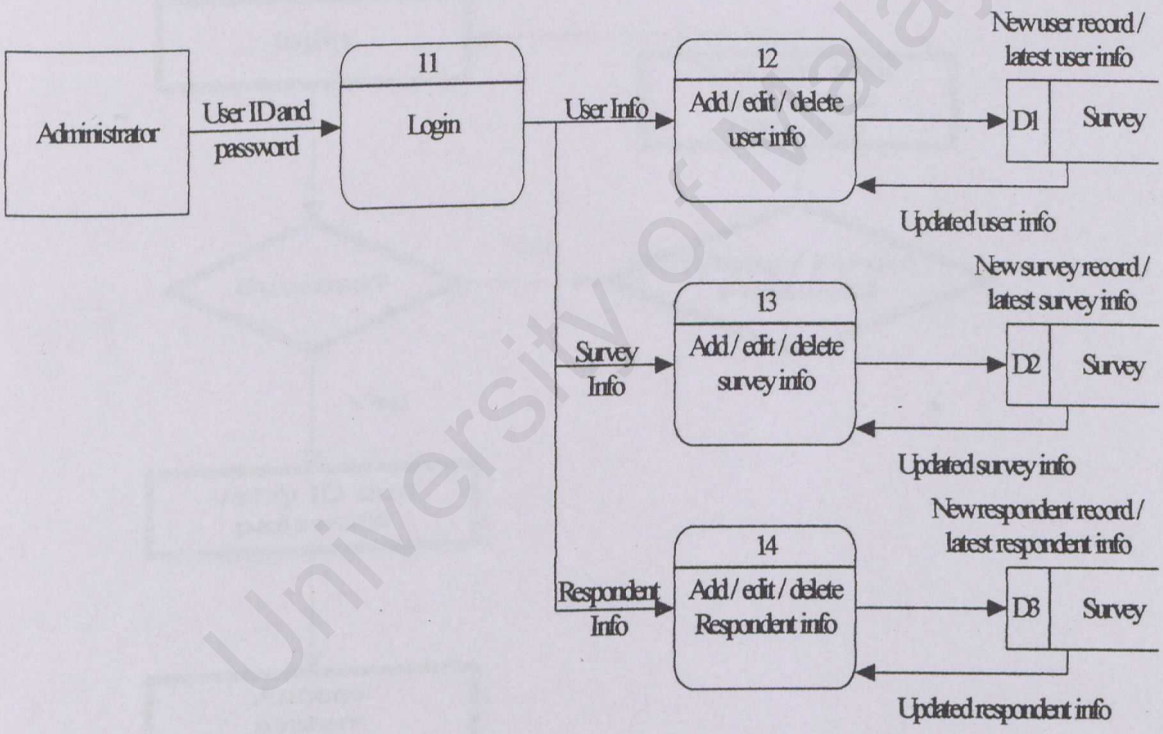


Figure5.4 (c): Data Flow Diagram for Administrator Module

5.3.3 Registration

The user starts with log-in in registration. Login is success if the password is correct, and the user ID is verified. The user can access the system and all the survey that he/she had created previously. If login is unsuccessful because the password is wrong or forgotten, the system aids will help in retrieving password, and the user will has to return to the login process.

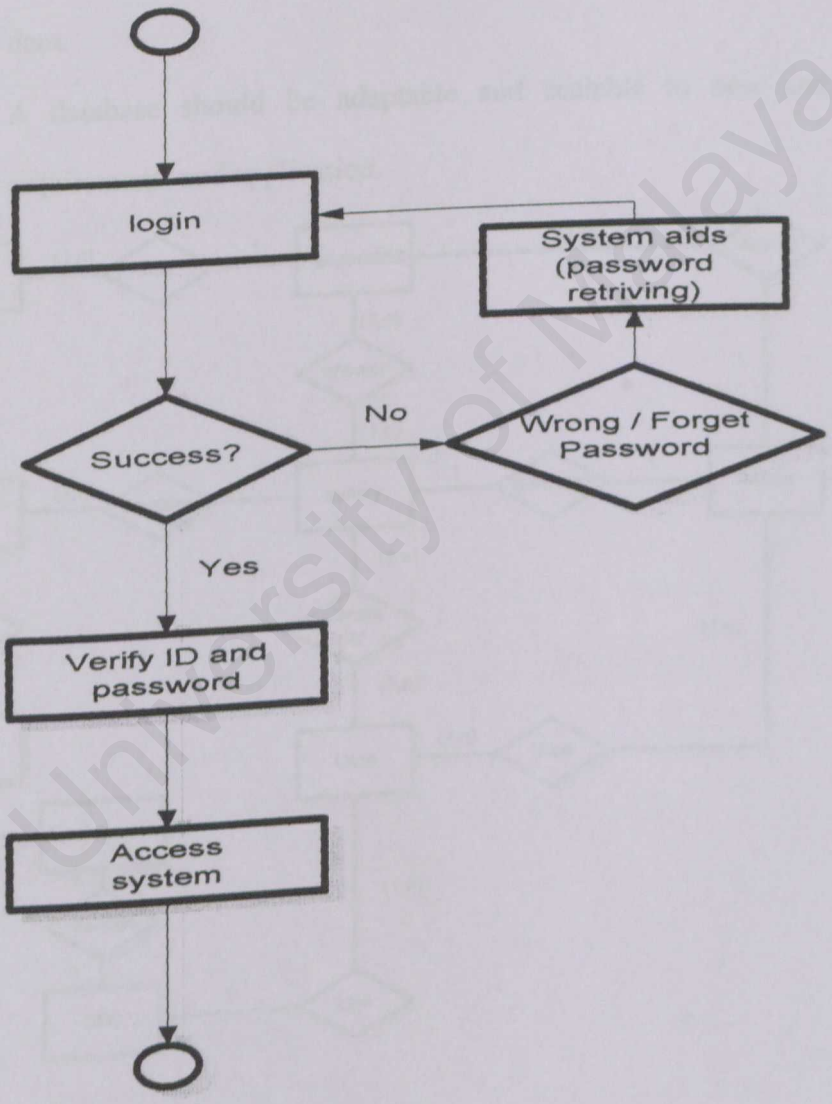


Figure 5.5: Structure flow of registration process

5.4 Database Design

Data storage is a critical component of the most information system. The goals of database design are as follow:

i. A database should be reliable – the stored data should have high integrity to promote user trust in that data.

ii. A database should provide for the efficient storage, update and retrieval of data.

iii. A database should be adaptable and scalable to new and unforeseen requirements and application.

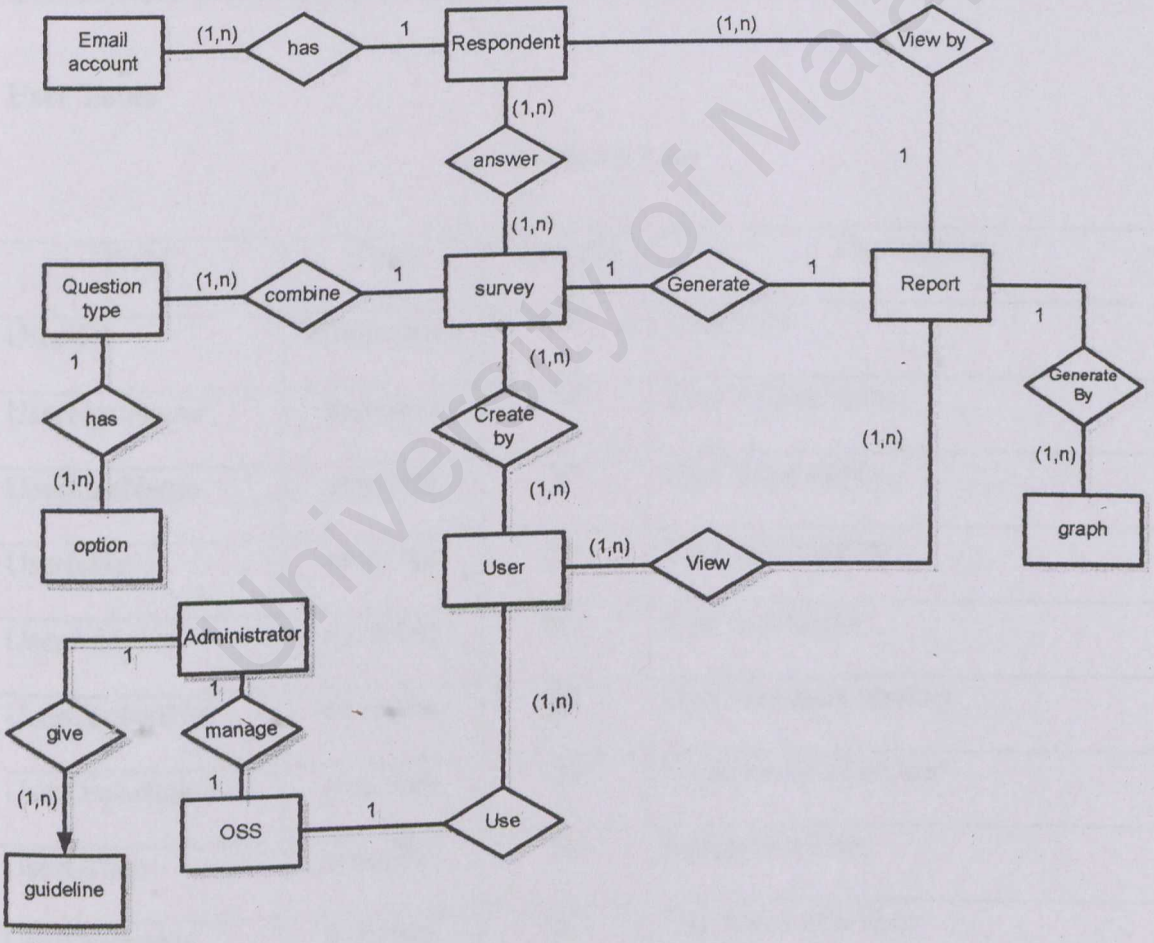


Figure 5.6: OSS Database Design

5.4.1 Data Dictionary

Data dictionary or metadata can be defined as descriptions of the database structure and contents. Data dictionary defines the field, field type and descriptions of each table.

AdministratorLogin Table

Table 5.2 Administrator Login

Field Name	Type	Length	Description
AdminID*	Uniqueident:	30	ID for Administrator
AdminPassword	nvarchar	30	Password for administrator

User Table

Table 5.3 User

Field	Type	Length	Description
UserID*	Uniqueident:	20	User's ID
UserFirstName	nvarchar	30	User's First Name
UserLastName	nvarchar	30	User's last name
UserIcNo	nvarchar	20	User's IC number
UserAddress	nvarchar	100	User's Address
UserContactNo	nvarchar	20	User's contact number
UserDepartment	nvarchar	30	Department of a User
UserOffice	nvarchar	30	Office of a User
UserUsername	nvarchar	20	Username of a User
UserPassword	nvarchar	20	Password of a User

UserLogin Table

Table 5.4: User Login

Field Name	Type	Length	Description
UserID*	Uniqueident:	30	ID for User only
UserPassword	nvarchar	30	Password for User

Respondent Table

Table 5.5 Respondent

Field	Type	Length	Description
RespondentID*	Uniqueident:	20	Respondent's ID
RespondentFirstName	nvarchar	30	Respondent's First Name
RespondentLastName	nvarchar	30	User's last name
RespondentIcNo	nvarchar	20	Respondent's IC number
RespondentAddress	nvarchar	100	Respondent's Address
RespondentContactNo	nvarchar	20	Respondent's contact number
RespondentDepartment	nvarchar	30	Department of a Respondent
RespondentOffice	nvarchar	30	Office of a Respondent
RespondentUsername	nvarchar	20	Username of a Respondent
RespondentPassword	nvarchar	20	Password of a Respondent

5.5 User Interface Design

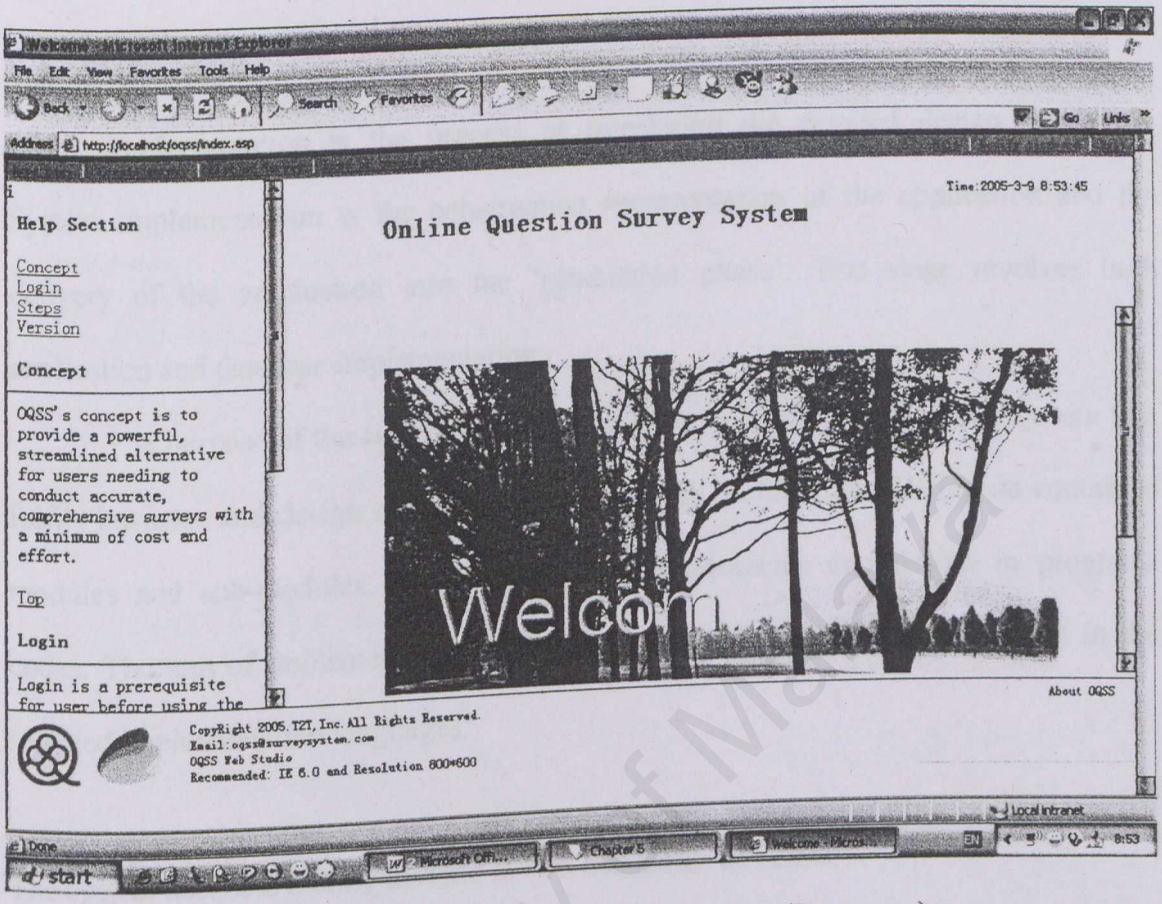


Figure 5.7: User Interface Design (Prototype)

CHAPTER 6: SYSTEM IMPLEMENTATION

6.1 Introduction

Implementation is the process of translating the detailed design into code. System implementation is the construction representation of the application and the delivery of the application into the 'production phase'. This stage involves both application and database implementation.

The purpose of the system implementation is to develop a functional system that fulfils business and design requirements. It includes building and testing its contained modules and sub-modules, involving system requirements and design in programs codes. The aim of implementation workflow is to implement the target system in the selected implementation languages.

The system design is mainly divided in two categories as below:

I Development environment

- i. Hardware Configuration
- ii. Software Configuration

II Software Coding

- i. Coding Approach
- ii. Coding Principles

6.2 Development Environment

The initial stage of system implementation involves setting up the development environment. Development environment has certain impacts on the development process of a good software system. Development environment consists of hardware and software configurations. The appropriateness of the hardware and software chosen is very important because it will not only help to expedite the system developments but determine the success of the project. The hardware and software tools used to develop the entire system are discussed below:

6.2.1 Hardware Configuration

Table 6.1 Hardware Configuration

Hardware	Requirements
Processor	Intel Pentium 4 processor 1.80 GHz
Motherboard	PC Partner I845 chipset Main board
RAM	256MB Kingston SDRAM PC133MHZ
Hard disk	HDD 40.0GB Maxtor/Seagate 7200rpm HDD
Graphic Card	32MB NVIDIA TNT2 AGP
Other standard computer peripherals	52x 24x 52x CDRW 10/100MBPS Ethernet card 1.44MB Floppy Disk Drive Windows Compatible Keyboard and Mouse 15"Samsung Monitor

6.2.2 Software Configuration

Table 6.2 Software Configuration

Software	Purpose	Description
Microsoft Windows XP Professional	System Requirement	Operating System [Final Stage]
Microsoft Internet Information Service 6.0 (IIS 6.0)	System Requirement	Web Server host [Final Stage]
Microsoft Visual Interdev 6.0	System Development	Coding the web pages
Microsoft Internet Explorer 6.0 (IE 6.0)	System Development	Web Browser
Microsoft Access 2003	System Development	Database Design & Database Server
Adobe Photoshop	Interface Design	Image design and creation
Microsoft Project 2003	System Design	Diagram Creation [Earlier and final stage]
Microsoft Visio 2003	System Design	Diagram Creation [Earlier stage]

6.3 System Coding

System implementation phase involves programming or coding procedures, which converts the system requirements and design into program codes. That means programs that implement the design must be written. The most important thing in coding standard is the naming standard called comment written in '' green color. During the coding, the author has coded the system in a way that is understandable not only when revisit for testing, but also easier for future enhancement. Good coding approach provides easy identification and clear guide for programmers during the maintenance phase of the system.

6.3.1 Coding Approach

There are properly two types of coding approach, namely top-down and bottom-up. The bottom-up coding is based on coding the lower-level modules initially and leaving the high-level modules merely as skeletons that are used to call the lower modules, whereas the top-down approach is the reverse of the bottom-up approach. The Online Survey System was developed modularly using the bottom-up approach. Each lower-level function and procedure was developed individually which are then integrated into appropriate high-level modules accordingly. Bottom-up approach offers some advantages such as:

i. Critical functions can be coded initially to test their efficiency.

ii. Increase the development process as the lower-level modules or functions can be built independently and simultaneously without waiting or delaying the others.

iii. Testing can be conduct on some of the modules while the others are still under construction.

iv. Faults are easier to be detected.

6.3.2 Coding Style

Coding style is an important attribute of source code where it determines the intelligibly, readability and maintainability of program. An easy to read source code makes the system easier to be maintained and enhanced. The elements of coding style include internal documentation (source code level), methods for data declaration and approach to statement construction. Some of good coding practices that had been applied are as followed:

i. Indent coding – by formatting and indenting the codes, it helps to find and detected a place where an error occurred. In addition, the indent codes will be easier to read and it is useful in coding which involves a lot of conditional structure and loop structure

ii. Layout program source code to improve its readability – each sentence is begun on a new line; statement following control structure is indented; white space is used to set off related blocks of code

iii. Use of consistent and meaningful variables name – help a program to be "self-documenting" without excessive use of comments

iv. Comment code – write description or comments in the source codes

Active Server Page (ASP) is a primarily a scripting environment; while languages used to develop an ASP are HTML, VBScript and JavaScript. The challenge

of coding in ASP is of determining and separating the HTML source code from the scripting counterpart. Each of them is not hard to distinguish. Each ASP section contained within <% and %> delimiters and statements falls in this block are called ASP script. VBScript is used as the scripting language as the ASP statements.

For client-side scripting, it must be delimited by the <SCRIPT>.....</SCRIPT> tags. On the other hand, server-side scripting requires the RUNAT attribute set to Server so that the script should be executed on the server rather than the client (browser). An example is as below:

```
<SCRIPT LANGUAGE = "VBSCRIPT" RUNAT = "Server">
.....
</SCRIPT>
```

Another useful technique being used is inserting pre-built blocks with "#include" statement in an ASP page. For example, both top banner and left side navigation menu are managed in separate files. Then, pages that required displaying a top banner, for instance, used this include statement to achieve its display function. This approach is able to minimize duplication and simplify the possible maintenance work in the future. If the maintainer wish to modify the top banner, he or she only require making modification on one file, and without modify all the relevant files.

Below shows some examples of HTML coding, VBScript coding, and also JavaScript coding written in this system:

i. ASP Script

The easiest way to add a script to an Active Server page is by using the script delimiters <% and %>. Any text enclosed within these delimiters will be processed as a script.

```
<%
dim top_path
top_path="../"
ec=request.QueryString("ec")
if not isnumeric(ec) then
ec=0
end if
select case ec
case 0
case 1
m="User Name and password can't be empty"
case 2
m="Password is wrong"
case 3
m="Timeout of login"
case 4
m="User is be forbidden"
end select
%>
```

iii. VBScript Coding Examples

Below is an example taken from the project file name "userlogin.asp".

Note: ' character is used to create a comment

```
<%
dim
a(255,3),s_id,rs,sql,n,pathlevel,c_uid,c_sid,c_iprepeat,c_surveyname,c_dbname,c_h,c_vi
ewdata,c_submitpage,c_tablename,c_framestyle,c_memo,c_enstat,c_IPsubmit,c_enuse,c
_EndDate,c_enlink,c_yj,c_theend,c_htmlfilename,c_surveypsw
pathlevel="../"%>
<!--#include file="conn.asp" -->
<!--#include file="function.asp" -->
<%
set rs=server.CreateObject("adodb.recordset")
sql="select itemtype,itemname,rowname,eninput,inputrowname from itemtable where
s_id="&s_id&""
rs.open sql,cn,1,3
```

iv. **JavaScript Coding Examples**

Below is an example taken from the project file name "userlogin.asp".

Note: // character is used to create a comment

```
<script language="javascript">
function checkform()
{
if (myform.username.value=="")
{
window.message.innerHTML="Please enter user name"
myform.username.focus()
return false
}
if (myform.password.value=="")
{
window.message.innerHTML="Please enter password"
myform.password.focus()
return false
}
return true
}
</script>
```

iv. JavaScript Coding Examples

Below is an example taken from the project file name "userlogin.asp".

Note: // character is used to create a comment

```
<script language="javascript">
function checkform()
{
if (myform.username.value=="")
{
window.message.innerHTML="Please enter user name"
myform.username.focus()
return false
}
if (myform.password.value=="")
{
window.message.innerHTML="Please enter password"
myform.password.focus()
return false
}
return true
}
</script>
```

v. **Include File**

```
<!--#include file="bottom.htm" -->
```

The above command is used to display the bottom banner, which scripts indeed are written in "reportforms.asp" file.

6.3.3 Integration

Integration is also an important step to do during the implementation of OQSS. Since the system consists of several modules and sub system, integration was the last stage in the system to integrate all of them into a whole. In this step, some of the actions have been taken on the design of each module such as:

i. Match font size and font color;

ii. Background color;

iii. Add in related hyperlink.

After completing integration, the developer also has to check whether the integration can be used and applied in those pages less the system will not be operating well.

6.4 Coding Principles

Several principles were applied during the development of this system to ensure good quality and the proper structure in the code generation.

i. Reusability

Reuse has been the most focusing principle during the coding phase for this system. Reuse can improve product quality throughout the software development process. Here, 'reuse' refers to creating components designed to be reused in subsequent applications. In this system, the author has coded several useful coding blocks, which to be reused in other program code such as header and footer code of every web page file and error checking methods.

ii. Readability

Readability is also important during the system-coding phase. Codes are formatted to enhance understanding because it is very important when it comes to the enhancement of the system in the future by other people. Several strategies are used in preserving readability in the codes, including meaning variables and labels names, comment and proper identification.

iii. Robustness

Robustness refers to the quality that causes a system to be able to handle unexpected error and echo back with proper responses. Error handling should be done to increase the robustness of the system. The system has the ability to validate systems input to ensure correct data is provided in order to protect system integrity. Besides that, database will also be back-up automatically for restore purpose when there is some unplanned system interruption occurs. Appropriate errors message were displayed response to user's input.

CHAPTER 7: SYSTEM TESTING

7.1 Introduction

System testing is an integral component of the software process and an activity that must be carried out throughout the life cycle. It is an interactive process to evaluate the effectiveness of a program in executing its function and is a very important step has to be well conducted before the system is delivered to the end user. System testing is also involved the process of validation and confirmation of the system to ensure that the quality of the system has meet the specific requirement.

This phase is also often referred to as Verification and Validation (V & V). Verification refers to the set of activities that ensure the software correctly implements a specific function. Validation refers to a different set of activities that ensure the software has been built is traceable to user requirements. A successful test is one in which no errors are found.

Through out the testing process, the specification, design, and program will be reevaluated to ensure that it is error free and work according to specification. Generally, the purposes of system testing are as follow;

a) To detect and verify errors and bugs that exists during the implementation phase

b) To reveal different classes of errors and do so with a minimum amount of time and effort

c) To demonstrate that software functions appear to be working according to specification

d) To demonstrate that behavioral and performance requirements appear to have been meet

e) To correct all the errors and bugs

Therefore, a well perform system testing is capable of detecting errors that cannot be traced during analysis, design and implementation phases.

7.2 Type of faults

During the process of system testing, there will be several types of errors and bugs that can be detected. Therefore, it is important to know the kind of faults to seek. Faults can be categorized as below:

i. Algorithmic fault

Occur when a program algorithm or logic does not produce the proper output for a given input because something is wrong with the processing steps. This usually happened because of mistake made during the program design process and it can be detected easily when going through the steps of the program code.

ii. Syntax fault

Syntax fault can be checked while parsing for algorithmic faults. This will ensure that the construct of programming language is need properly.

iii. Documentation fault

Occurs if the documentation does not match what the application does, and such faults can lead to other faults later because of the wrong implementation. Usually, documentation is derived from the system design and provides a clear description of

what the programmer would like the program to do, but the implementation of these functions is faulty. Such faults can lead to other faults later.

7.3 Testing Strategy

Testing is a process of exercising or evaluating a system by manual or automatic means to verify that it has satisfied requirements or to identify differences expected and actual results. A well-defined system testing strategy can assist in controlling a system testing process that is complete and detailed, besides being able to improve the effectiveness of the testing process to the developing system.

This project was tested with the following generic characteristic:

i. Testing begins at the module level and works "outward" toward the integration of the entire system.

ii. Different testing techniques are appropriate at different points in time

iii. Testing and debugging are different activities, but debugging must be accommodated in any testing strategy

Testing can uncover different classes of errors in a minimum amount of time and with a minimum amount of effort. There are four types of testing strategies:

i. Unit Testing

ii. Module Testing

iii. Integration Testing

iv. System Testing

7.3.1 Unit Testing

Unit testing is the first approach in system testing. In unit testing, each unit should be tested individually and in isolation by exercising its inputs and observing its outputs or behavior. It may also be possible for the unit to be tested using the facilities available in the development environment (such as stepping through the statements of code using a debugger). This process verifies that the component functions properly with the types of input expected from studying the component's design. Unit testing may also be termed component testing. Typically, the software engineer or programmer who coded the unit will design and run a series of tests to verify that the unit meets its requirements.

Following steps are used in carry out the unit testing for Online Survey System:

i. Control objects are tested to ensure its functionality.

ii. Test cases are developed to ensure that the input is properly converted into the desired output.

iii. The code of the program is examined by reading through it to spot for possible algorithm, data and syntax faults.

iv. Different data types are used to test the error handling function.

7.3.2 Module Testing

Module testing is a collection of dependent components that encapsulates related components only. Therefore, it enables each module to be tested independently. This testing will ensure that the module calling sequence in this project is systematic. The main purpose of the test is to verify the correctness of the flows of events. Therefore,

with the system development process being carried out module by module, the module testing will also be carried out once a module has been completed.

7.3.3 Integration Testing

Integration testing is the process of verifying that the system components will work together as describe in the system and program design specification. In this phase, the test is conducted on the interface of two interactive components in a single unit. This involves the examination process of two interface components in the system and it continue until the entire system is developed.

In general, integration testing is carrying out to ensure the interface between modules can function properly. The most common problem that arises in large software system is subsystem interface mismatches. The subsystem test procedures should concentrate on the detection of interface error by vigorously exercising those interfaces.

7.3.4 System Testing

Final testing procedure done is system testing. However, testing the system at whole is very different from previous unit testing and integration testing. System testing is a series of different tests designed to fully exercise the software system to uncover its limitations and measure its capabilities. The objective is to test an integrated system and verify that it meets specified requirements. Although each test in this project has a different, all work to verify that system elements have been properly integrated and perform allocated functions.

There are several types of system testing that are worthwhile for a software system. For this project, three types of system testing are used:

i. Function Testing

System testing begins with function testing, which is based on the system's function requirements. Function testing is performed in a carefully controlled situation. Function testing is based on the system functional requirements. In other words, a function test is used to check that whether the integrated system performs its functions as specified in the requirements. Each module involved is tested individually to determine whether the system performs as required.

ii. Performance Testing

Performance testing addresses the non functional requirement of the system after function testing is completed. System performance is measured using performance objective set by potential users as highlighted in the non functional requirement section as guideline. The purpose of this testing is to test the run-time performance of software within the context of an integrated system. It requires both hardware and software instrumentation.

iii. Security Testing

These system tests will attempts to verify that protection mechanism built into the system will protect it from improper penetration.

CHAPTER 8: SYSTEM EVALUATION

8.1 Introduction

System evaluation is the final phase of developing a system and an important phase before delivery the system to the end users. System evaluation was related to user environment, attitudes, information priorities and several other concerns that are to be considered carefully before effectiveness can be concluded.

At this point, the Online Survey System is considered successfully achieved and implemented. The system is now ready for the evaluation and assessment concern. Several issues and reviews on the final system are explained in this section.

8.2 Problems and Solutions

The following are the major problems encountered during the beginning of the project through out the end of the system development process.

i. **Difficulty in Choosing Suitable Development Technology, Programming Language and Tools**

There are many software tools available to develop Online Survey System. Choosing a suitable technology and tools was a critical process as all tools possesses their own strengths and weaknesses. In addition, the availability of the required tools for development was also a major consideration.

Solution:

Seeking advises and views from project supervisor, course-mates and even seniors engaging in similar project were carried out. Furthermore, a lot of research and studies were done before any decision was made.

ii. **Lack of Knowledge in ASP, VBScript and JavaScript**

Since there was no prior knowledge of programming in ASP, VBScript and JavaScript, there was an uncertainty on how to organize the codes in a web page. These programming languages and concepts were never taught before and to implement such as application requires a fair grasp of the languages.

Solution:

Although it really cause a lot of time to learn the new technology, but choosing to program in ASP, VBScript and JavaScript proved to be a wise move. Most of the problems faced were manageable through browsing the Internet for related materials such as online ASP, VB and JavaScript tutorial, MSDN help files, and etc. Besides, the reference books for ASP, Visual Basic and JavaScript that available in the market also helped a lot. Discussion with friends especially seniors using the same technology was a great help. A more efficient method was through trail and error during the coding phase.

iii. **Lack of Hardware and Software Configuration Knowledge**

The environment between software and hardware need to be configured before the start of the development phase. For example, the security of IIS web server need to be configures and the virtual directly need to be set to point to the system.

Moreover, the database connection needs to be configured to connect the system to the database.

Solution:

Browse through the developer community in search for similar problems and solution posted in the community. Besides that, help files and reference from the Internet also being used to solve the problem.

8.3 System Strengths

Below are the strengths of Online Survey System:

i. **Simple and User Friendly Interfaces**

The system interfaces uses a series of light and soft color as its main color. These colors would not burden the users' eyes even they view the web page for a long time. The Graphical User Interfaces (GUI) designs for this system are similar with other common Online Survey System. So, the users will familiar with this system in a very short period. The Web pages are designed to suit a wide spectrum of user. Forms and other command buttons are readable, simple and easy to use. The novice users will feel comfortable with this system because this system does not using the jargons in its GUI.

ii. **Provide an Easy to Use Tool**

The commands and the layout of this project are simple and well organized, therefore it is easy to use, simple to learn and understandable. Normal users with some computer knowledge will find the Web page is easy to handle.

iii. **Web Enabled**

The system was based on the web technology. It was using the client server approach that allowed processing load to be shared between the client and the server, thus reducing the burden on the server and allow it to provide better service.

iv. **Effective User Login and User Identification System**

Users are protected by authentication feature. Login and password are required before allowing the users access to the protected site. All types of users using a same login page to login their account. The system is able to identify different type of user and the level of access to the system. The system will only allow the user to access to respective links only.

v. **Implements error handling**

To avoid run time error, this system is developed with error handling function. Error message will be displayed when exceptions encounters.

vi. **Provide database maintenance**

Users are able to do housekeeping for database maintenance. For example, they can create, add, modify, update, and delete customer records in the database.

vii. **Significant validation on input data**

Check for the validation of every data input in the field and prompt the user of invalid data being input and ask for valid data. Data field that disallow data to duplicates will also prompt the user about the error.

viii. **Reliability**

Inputs of the user to the system are validated and verified to prevent errors caused by the invalid input. If there is an invalid input, error messages that specify the error will be prompted to inform the user about the error. Besides that, database that contains all the essential and important information will be back-up automatically at a specific interval.

ix. **Consistency**

The system design is consistent throughout the whole system. The main menus are remained at the same position although the user switched from one module to another. Thus, users can easily search for a particular option that they require in the system.

x. **Fast Response Time for Information Retrieval**

The Web pages are designed in such a manner that they are loaded in a reasonable amount of time to ensure users need not wait for a long time to view the pages. Heavy graphics are avoided and ActiveX controls are kept to the minimum wherever possible.

8.4 System Constraints & Limitations

Although the best design and great implementation efforts has been used to develop Online Survey System, but it still has several weakness, which will affect the system. These weaknesses are mainly caused by time constraint. The following are the weaknesses of the system:

i. **Browser limitation**

This system can only run in Internet Explorer 4.0 and above. This is due to the deployment of VBScript language, which is the default supporting language for ASP. User uses browsers that do not support these features will not be able to use the functions available in this system.

ii. **Language limitation**

This system only supports single communication language, which is English.

iii. **Email**

For these email that must be dispatched without delay, Email feature is able to send the survey form immediately to the respondent. However, Online Survey System does not provide this facility.

iv. **No Proper Generating Report Function**

This system cannot generate a proper report regards the result. This is due to such function requires the system to be executed at the mail server with at least four CPUs and high requirement for memory since the certain surveys are created in dynamic format. However they can print the description of the report.

v. **Limited reporting analysis**

Functions in Online Survey System sub-module are limited to few report generation. Besides, no graphical illustrations such as chart, bar chart and so on.

8.5 Future Enhancements

Future enhancement can be done to make the system more advances in order to improve the quality of the system. A system development knows no boundaries as new requirements and better implementation methods continue to arise and evolve. There are several enhancements that could extend after developed the system.

i. **Provide Report Generating Function**

This function should be included in futures because this function will allow user to generate report in printable format regarding the survey data, results and graphical illustrations such as chart, bar chart and so on.

ii. **Provide Other Languages Version**

As the system is aim at Malaysian Citizens, therefore besides English, providing another version of the national language – Bahasa Malaysia version would be a good idea.

iii. **Provide Email Service**

This function should be included in futures because this function will allow user to email the survey form to the respondents.

8.6 Knowledge and Experience Gained

From the beginning of this project until the final documentation, a number of problems have occurred and experiences are learned from there. This project gives a lot of benefit and knowledge, there are:

i. **Communication and Presentation Skills**

Communication and presentation skills are really important during the viva session. Presentation material must be interesting but yet informative to describe the whole system. Nevertheless, language fluency and body language also play a

vital role during the whole presentation session. This whole experience provides me a step forward as to prepare me for the future working environment.

ii. Development tools knowledge

During the system coding and implementation, a lot of knowledge and techniques in ASP, HTML, VBScript, and JavaScript are gained. By practically apply them in the application; it is able to improve the understanding about the languages themselves as well as their integration.

iii. Communication skill

During the group discussion, a lot of communication skills are required to achieve cooperation and comprehension among group members. It provides advantage in exploring circumstance that similar to future working environment.

iv. Self expression

Involvement and experiences gained during system development have provided the change for self-improvement and evaluation. System design and coding give a great chance to express my own opinions and ideas.

8.7 Reviews on Goal

At the final stage of the project, there were certain expectations on what would be achieved. The following is the expectations that have achieved:

8.7.1 Expectation Achieved

In overall, the system had fulfilled the expectations stated by the project. Basically all the functions of the system was designed and implemented and have been achieved successfully. The system also is eligible for future growth and maintenance. The non-functional requirements such as reliability, usability, maintainability and efficiency also are met by the system.

8.7.2 Objectives Achieved

The project had successfully created a system that provides online survey method for users to ease their way on doing the survey. As a conclusion, the above statements have clearly point out that the objectives to establish the system had been achieved.

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APPENDIX A

SURVEY ON USAGE OF COMPUTER, INTERNET AND ONLINE SURVEY

We, Fang Yen, How Kian and Choi Ngor, the undergraduates of FCSIT, UM, are currently conducting a survey in accordance with the above mentioned for our final year project. This will only take you a few minutes of time. Please answer the survey sincerely as it will be useful for our project. Your participation is much we appreciate.

A) Demographic Details

Gender : □ Male □ Female

Age Group : □ below 25 □ 26 – 30 years □ 31 – 40 years □ above 40

Occupation : □ Academician
□ Researcher
□ Others: _____

1. How often do you use computer per week?
   - □ Seldom
   - □ Moderate
   - □ Frequent
2. Do you own a personal computer?
   - □ Yes
   - □ No
3. Do you access to internet?
   - □ Yes
   - □ No
4. How long of time will you spend for accessing the internet per week?
   - □ < 4 hours
   - □ 4 – 7 hours
   - □ 8 – 14 hours
   - □ > 14 hours
5. Normally, what is your **main purpose** for accessing the internet?
   - □ Chatting
   - □ Checking mail
   - □ Information searching

- ☐ knowledge/skills sharing
- ☐ Entertainment
- ☐ Others: _____

B) Survey

You can tick (√) more than one answer in the following questions.

1. How often do you conduct a survey?
   - ☐ Seldom
   - ☐ Moderate
   - ☐ Frequent
2. How do you conduct a survey?
   - ☐ Interview
   - ☐ Questionnaire
   - ☐ Observation
   - ☐ Others: _____
3. Do you design or create the survey by your own?
   - ☐ Yes
   - ☐ No, please specify: _____
4. What is (are) the tool(s) you use specifically in preparing / designing the survey?
   - ☐ Internet survey provider's tools
   - ☐ Released software
   - ☐ Multiple references, e.g. Internet, books, magazines, etc
   - ☐ Others: _____
5. What is (are) the **statistical** tool(s) you currently use?
   - ☐ SPSS
   - ☐ S-Plus
   - ☐ Minitab
   - ☐ Excel
   - ☐ Others: _____
6. Problem(s) encountered when designing the survey questionnaire:

- ☐ The process in creating the questions that related to the objective of the study.
- ☐ Too much workloads involved when designing the questions using tools like word and others statically tools.
- ☐ The limitations of the design tools, such as SPSS, S-Plus, Minitab, that do not generate graphs.
- ☐ Time / cost consuming
- ☐ Others: _____

7. What are the problems faced when analyzing data?
   - ☐ Do not generate charts or graphs automatically after you received the answers from respondents.
   - ☐ Manually data key-in in current tools, such as SPSS.
   - ☐ The incompleteness of the survey form.
   - ☐ Others: _____
8. Have you been encountered any problem when using **online survey system**?
   - ☐ Yes (proceed to Question 9)
   - ☐ No (proceed to Question 10)
9. Problem faces during the process:
   - ☐ Data collecting
   - ☐ Result viewing
   - ☐ Not free and involve cost
   - ☐ Create an effective and useful questionnaire
   - ☐ Time involved in understanding the terms and rules
   - ☐ Not user friendly
   - ☐ Difficult to use
   - ☐ Others: _____
10. Kindly rate the following criteria in creating an online survey based on your consideration:

    1 – Very Important

    2 – Important

    3 – Not very important

4 – Not at all

a) Survey questionnaire generating process ----------
[ ]

b) Data collecting and analyzing processes ----------
[ ]

c) Survey conducting procedure ----------
[ ]

d) The completeness of the survey ----------
[ ]

END OF SURVEY

Thank you for your cooperation

APPENDIX B

TABLE OF CONTENT

LIST OF FIGURE

Appendix B: User Manual

This user manual will provide step-by-step instruction, which will guide and facilitate the user effectively in order to use this system.

1. Login

i. Key in the User Name and Password in corresponding textboxes as shown in the Figure 1.

ii. Click Login button. The system will validate the username and the password. If the detail is correct, the main or index page will be shown (refer Figure 3). Else the error message will be shown.

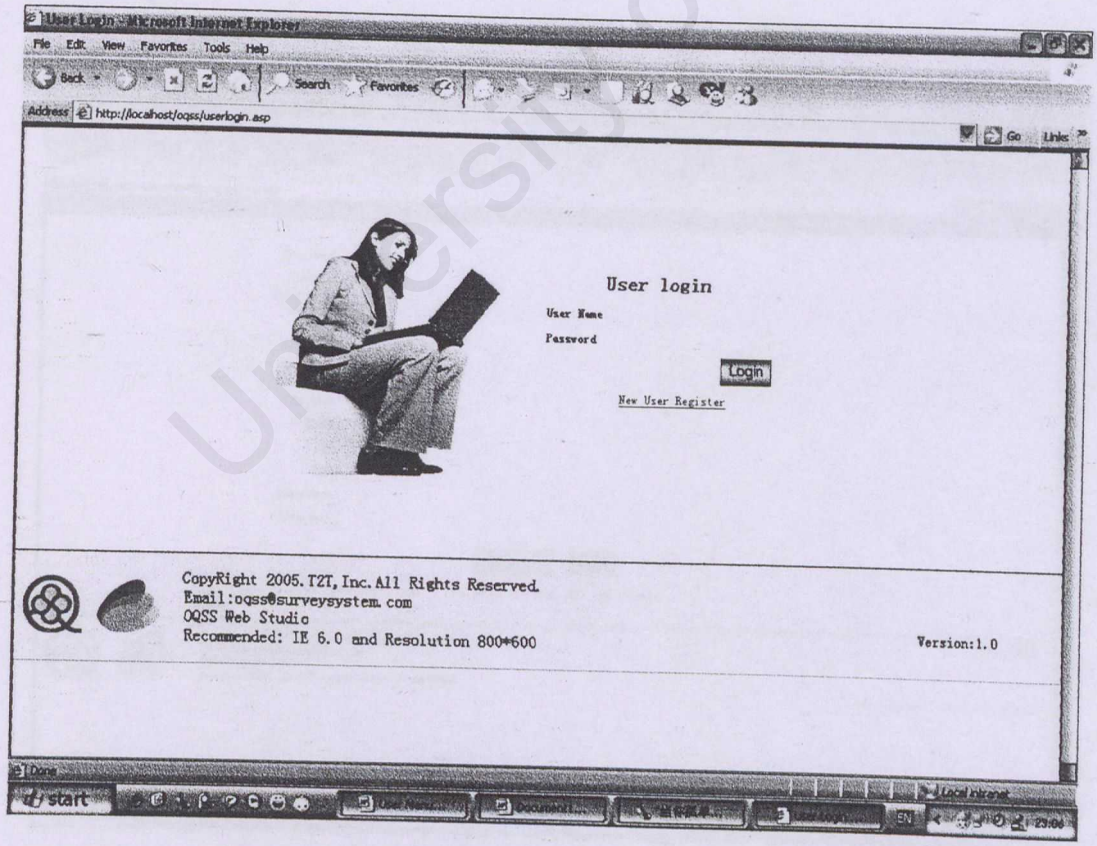

Figure 1: Login Page

2. New User Register

i. Click the New User Register link as shown in Figure 1. User Registration page will be shown.

ii. Key in all the corresponding information in the relevant fields. * means compulsory. Only a-z, A-Z, 0-9, ., @, /,: are allowed. Error message will be shown once one of the compulsory fields is not completed.

iii. Click Register to complete the registration. System will validate the registration to check if the user already registered. A message will be shown to state the user already in list. Or the information will be updated by the system and the Login Page (refer Figure 1) will reappear for further login.

iv. Or click back to return to the Login Page to terminate the registration process.

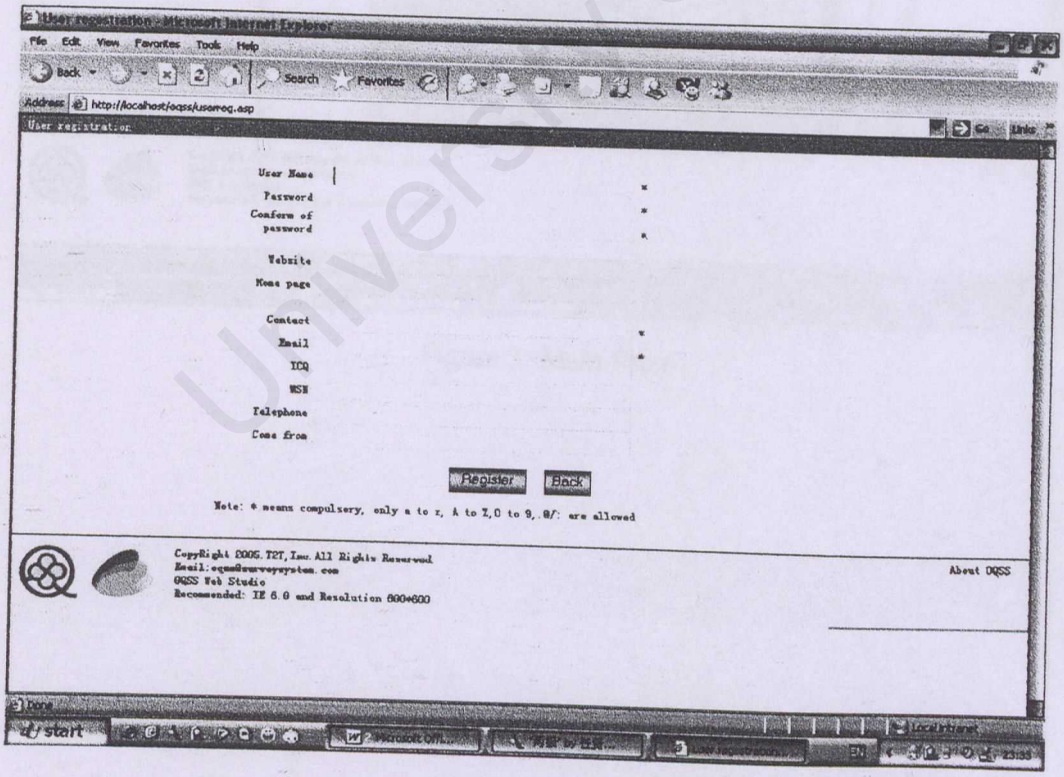

Figure 2: New User Registration Page

3. Main Page

The page contains hyperlinks that link to other functional pages such as Home page (itself), Create Survey, List of Survey, List of Question, Help, Modify Password and Exit. Besides, Help Section and About OQSS hyperlinks are provided as well. These hyperlinks appear on each of correlated pages.

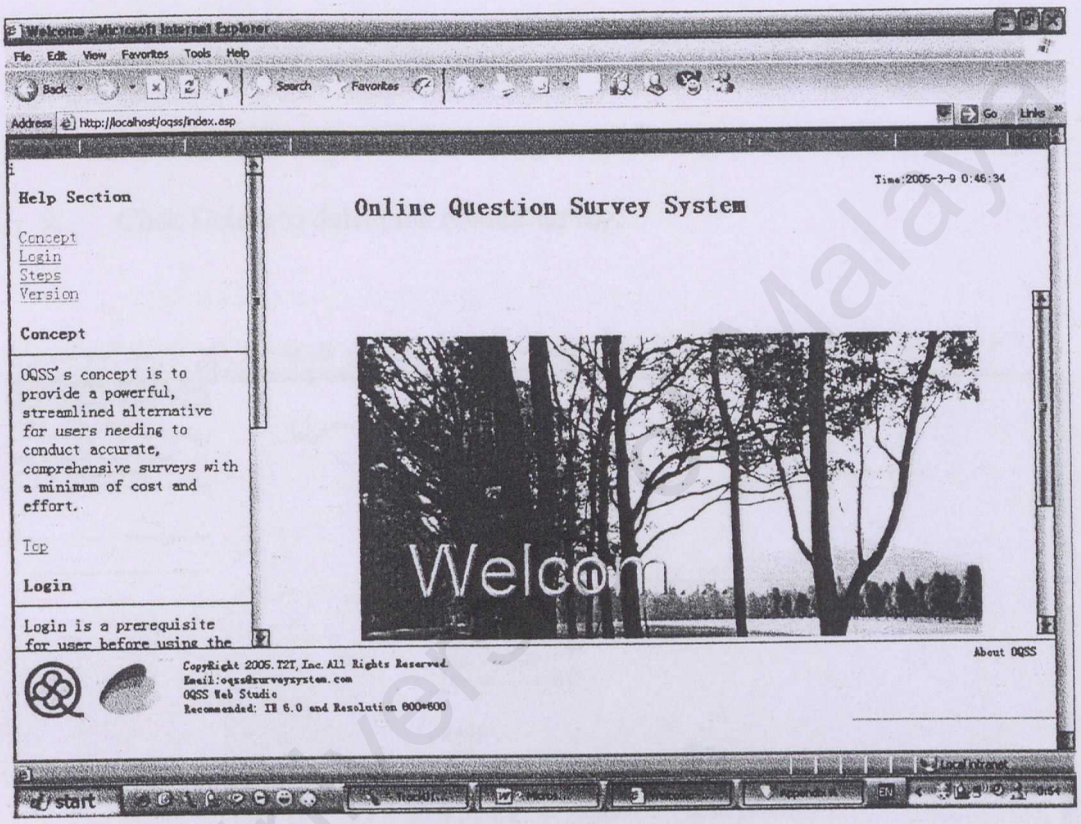

Figure 3: Main Page

4. Creating Survey Process

4.1 Step 1 - Create Survey

i. Click Create Survey to open Create Survey Page.

ii. Key in the relevant detail as well as to select the intended styles and controls.

iii. Click Create Survey button to complete the task. The created survey will appear right bottom of the page.

iv. Click Modify to modify the survey created.

v. Click Delete to delete the related survey.

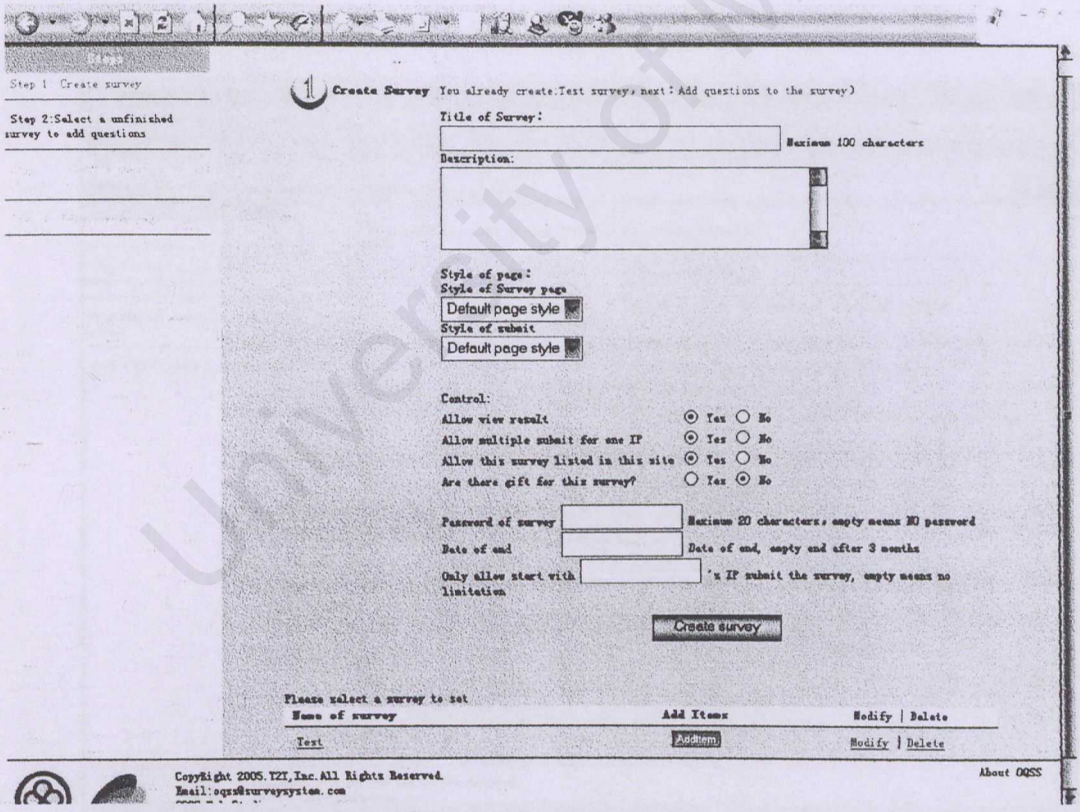

Figure 4.1: Create Survey Page

4.2 Step 2 - Add Questions

i. Click Add Item which accompanies the related survey created in Step 1 or click the hyperlink Step 2: Select an unfinished survey to add question on the left. The Add Questions page will appear.

ii. Key in the questions and select the question type.

iii. Select a defined question (optional). The defined question is not modifiable.

iv. Click Add Questions button. The added question will appear on the bottom of the page.

v. Click Modify to modify the question created.

vi. Click Delete to the related question.

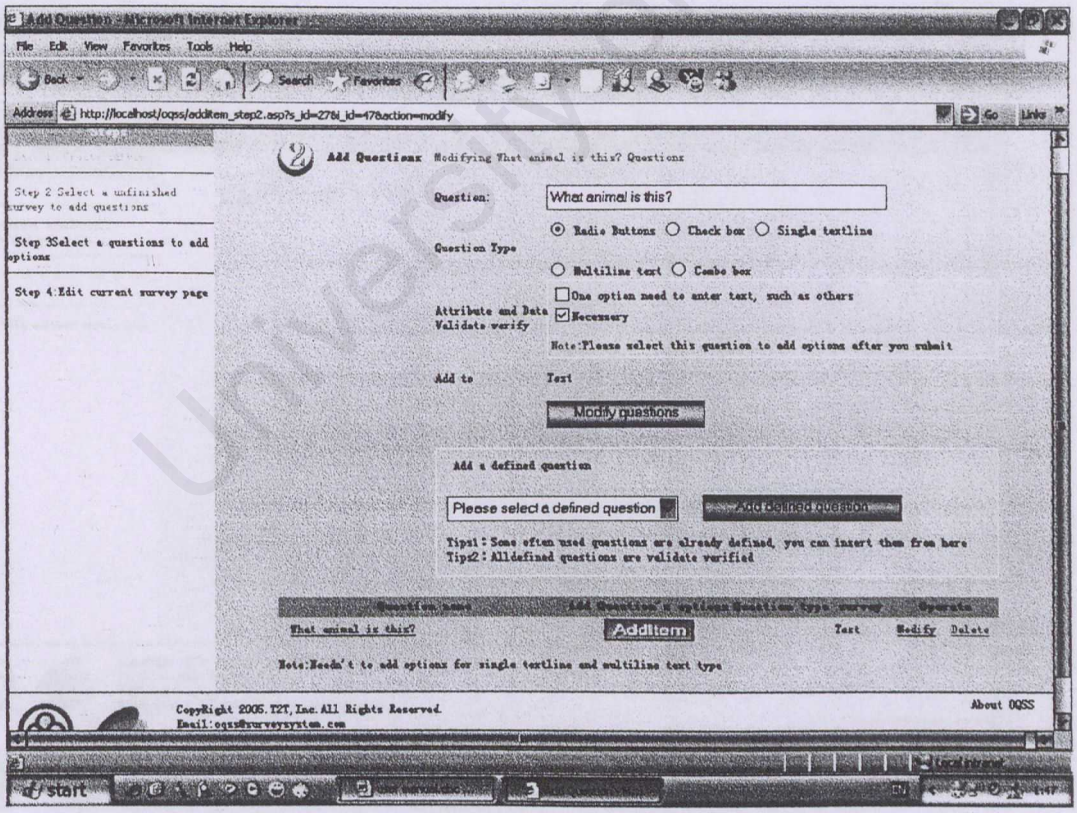

Figure 4.2: Add Questions Page

4.3 Step 3 – Add Question's Option

i. Click Add Item which accompanies the related survey created in Step 2 or click the hyperlink Step 3: Select question to add options the left. The Add Question's Option page will appear.

ii. Type in the option.

iii. Click Add Options. The added options will be listed as shown in Figure 4.3.

iv. Select the radio button beside the title of option means to set that option as default answer.

v. Select Modify to edit the option created.

vi. Select Delete to delete the relevant option.

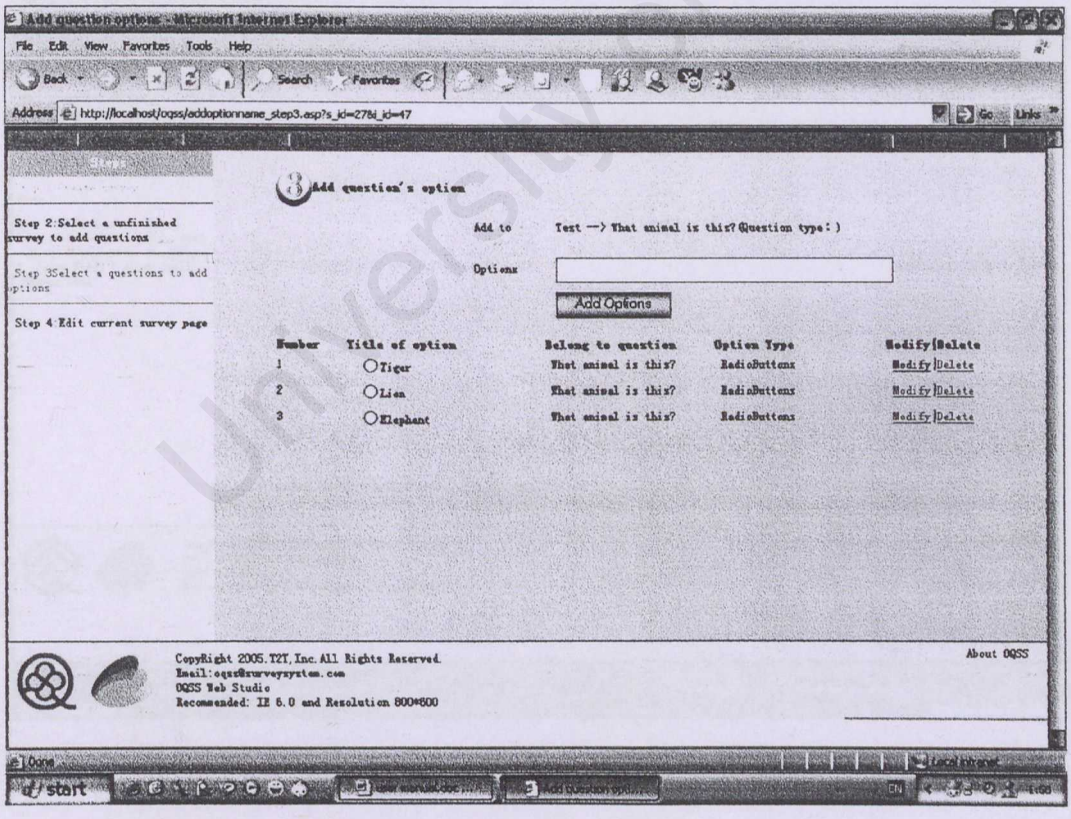

Figure 4.3: Add Question's Option Page

4.4 Step 4 – Edit Current Survey

i. Click the hyperlink Step 4: Edit Current Survey Page. The page contains in three different modes, namely Preview mode, Design mode and Create HTML file.

ii. Preview mode allows user to view the layout of the survey created.

iii. Design mode allows user to made further amendment or enhancement to the survey created.

iv. Create HTML's file allows user to finalize the survey created. The survey in html format cannot be modified.

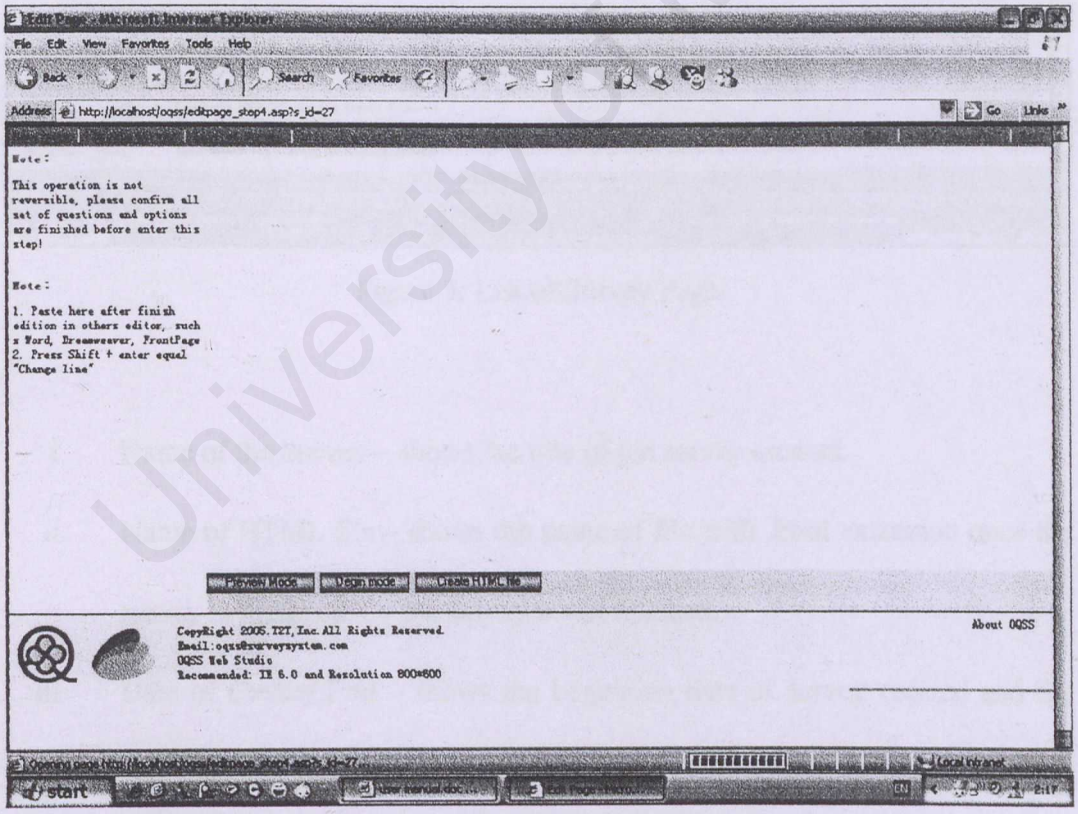

Figure 4.4: Edit Current Survey Page

5. List of Survey

The page depicts all the actions can be done on the survey created.

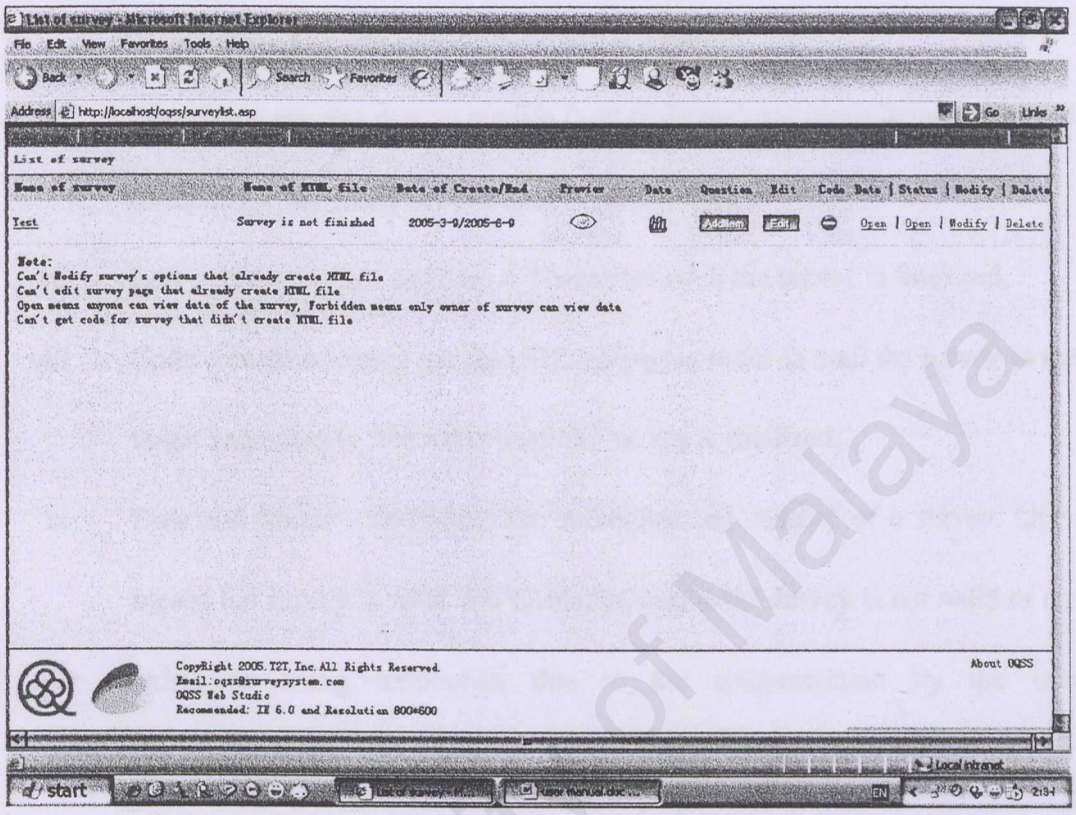

Figure 5: List of Survey Page

i. Name of the Survey – shows the title of the survey created.

ii. Name of HTML file – shows the name of file with .html extension once the survey is finalized. Or the survey is not finished.

iii. Date of Create/ End – shows the beginning date of survey created and the end date for the existence of that survey. The survey will last for three month's time if the end date is not specified.

iv. Preview – views the survey being created. This icon is viewable only once the survey is finalized in html format.

v. Data – shows the results of the answered survey in pictorial form such as bar or pie chart. Viewable once the survey is finalized.

vi. Question – enables user to modify (add or delete) questions being generated once the survey is not yet finalized – refer to Step 2.

vii. Edit – directs user to the Step 4. Forbidden once the survey is finalized.

viii. Code – enables user to get the URL address in order to mail the survey to the target respondents. Viewable once the survey is finalized.

ix. Date and Status – determine the feasibility and validity of a survey. Open means the survey is valid and forbidden means the survey is not valid or not exists or being terminated due to the customization by the user himself/herself or due to the date specified.

x. Modify – enables user to edit the survey once the survey is not yet finalized.

xi. Delete – enables user to delete the survey created.

6. List of Questions

The page enables user to view all the questions being created in accordance to each survey.

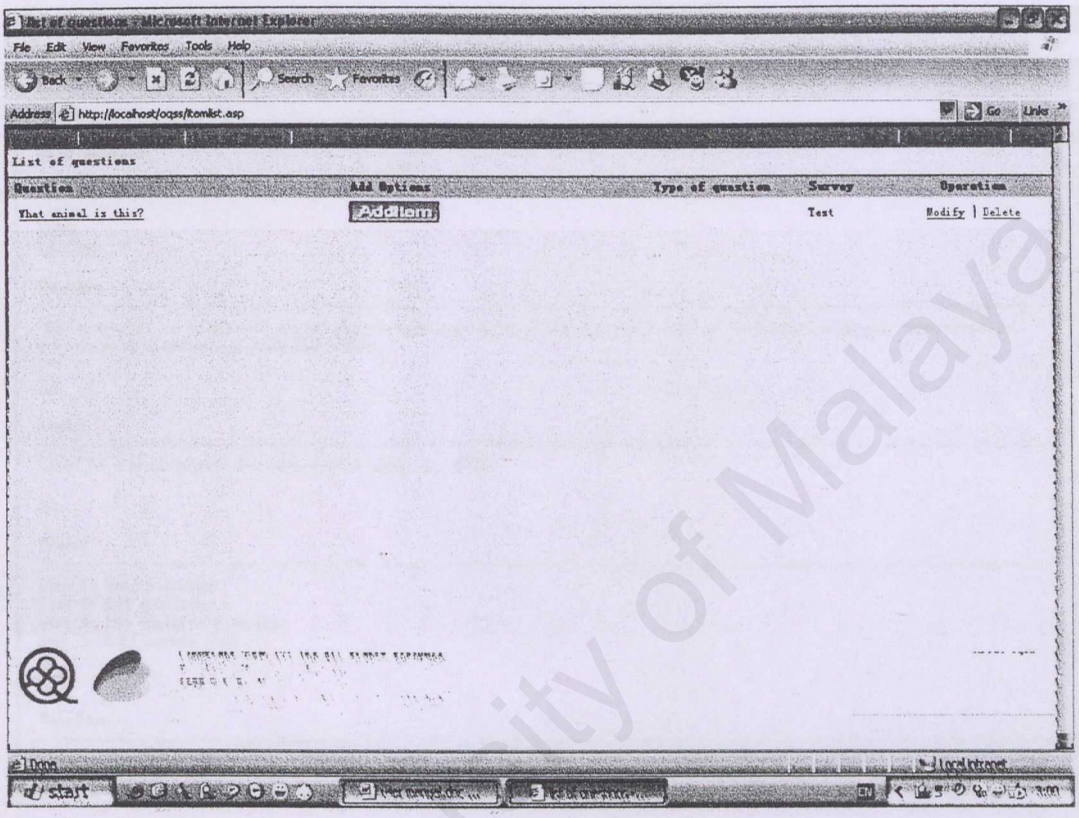

Figure 6: List of Questions Page

i. Question – list the questions being created for each survey.

ii. Add Options – enables user to add option to the question of the survey (refer to Step 3). Or it will show finished means the question of the survey is not modifiable.

iii. Survey – shows the title of the survey created in relation to its questions.

iv. Operation – enables user to modify or delete a survey.

7. Help

This page depicts information about the OQSS in view of its concept, login, steps of creating a survey as well as the version of the system.

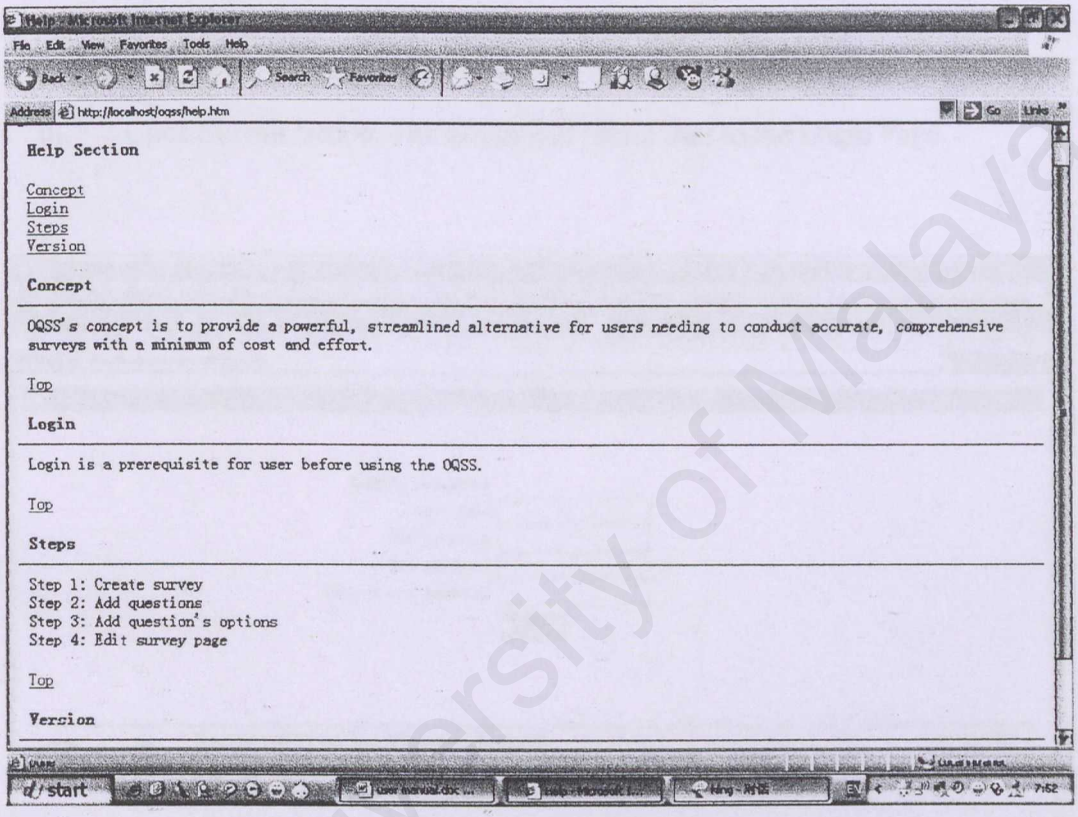

Figure 7: Help Section Page

8. Modify password

i. Click the Modify Password hyperlink. The Modify Password Page will appear. Before that user must login to the system first.

ii. Key in User Name, Old Password, New Password and Reenter New Password.

iii. Click Submit button. The action will return user to the Login Page.

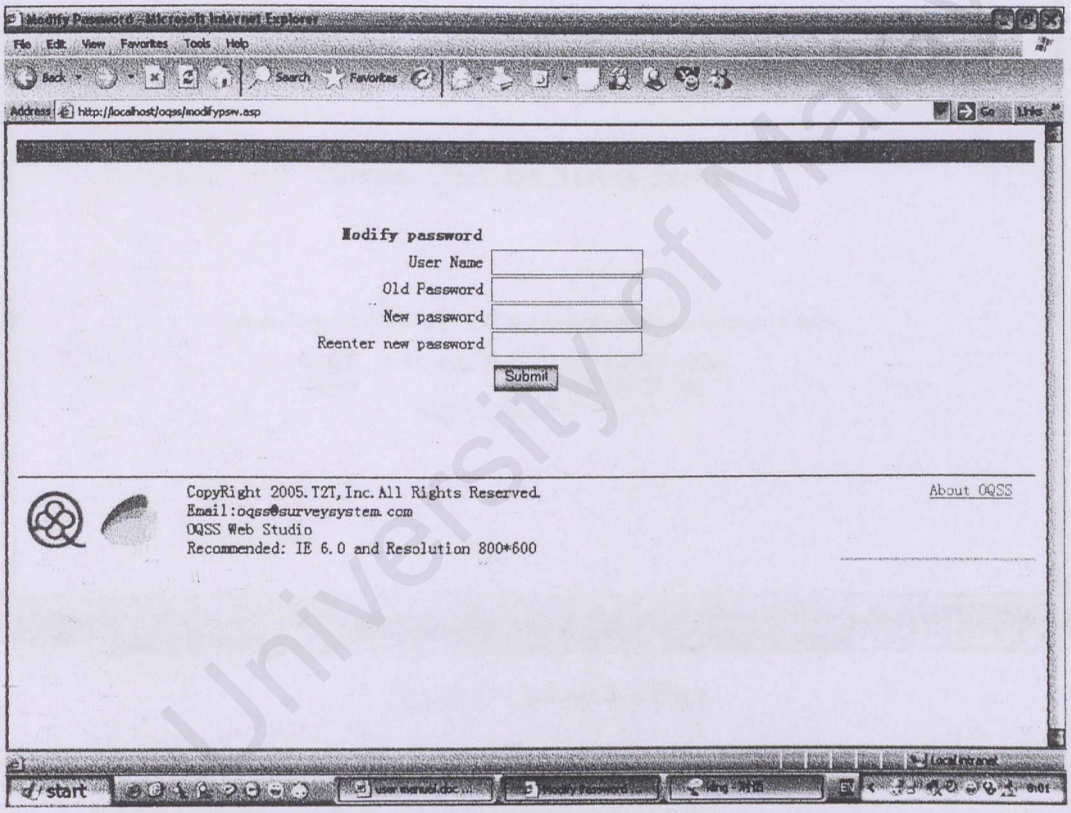

Figure 8: Modify Password Page

9. About Us

The page depicts the contact information of the company. Besides through the company address and phone number (Office and Hand phone), user also can sending email to the company.

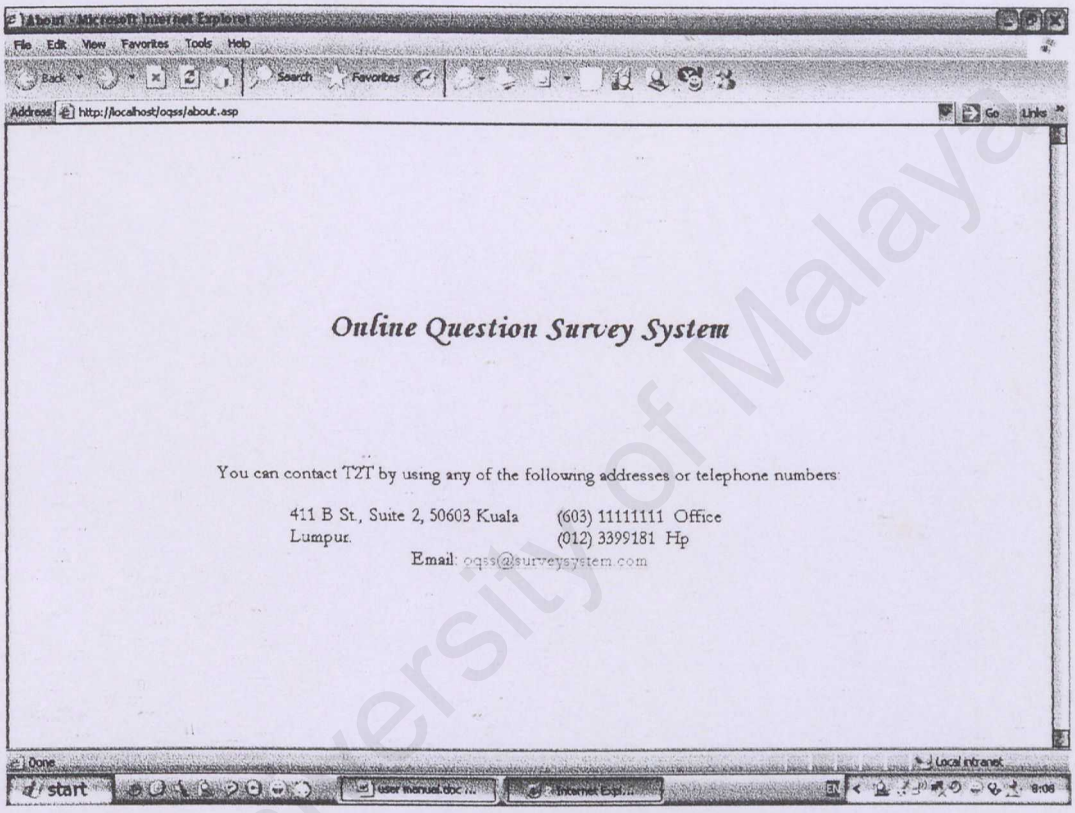

Figure 9: Contact Us Page